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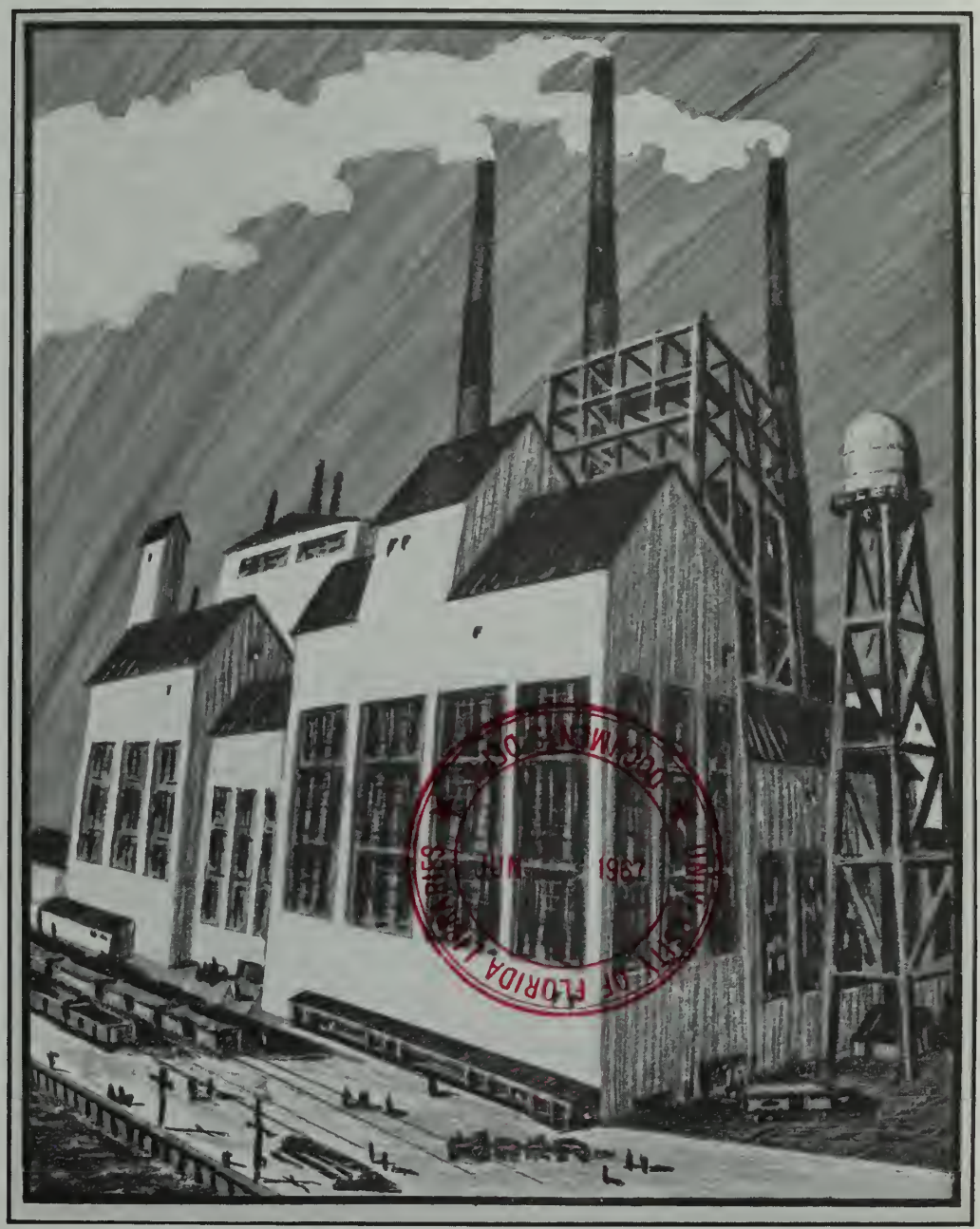

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DEFENSE INDUSTRY BULLETIN

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The purpose of the *Bulletin* is to serve as a means of communication between the Department of Defense (DOD) and its authorized agencies and defense contractors and other business interests. It will serve as a guide to industry concerning official policies, programs and projects, and will seek to stimulate thought by members of the defense-industry team in solving the problems that may arise in fulfilling the requirements of the DOD.

Material in the *Bulletin* is selected to supply pertinent unclassified data of interest to the business community. Suggestions from industry representatives for topics to be covered in future issues should be forwarded to the Business & Labor Division.

The *Bulletin* is distributed without charge each month to representatives of industry and to agencies of the Department of Defense, Army, Navy and Air Force. Requests for copies should be addressed to the Business & Labor Division, OASD(PA), Room 2E813, The Pentagon, Washington, D.C. 20301, telephone, (202) OXford 5-2709.

The Light Observation Helicopter Avionics Purchase Viewed as a Total Package Procurement

Harry J. Rockafeller
John P. Duffy

The Total Package Procurement Concept (TPPC), an innovation in DOD procurement policy, was widely publicized when it was applied to the Air Force C–5A program. In approximately the same time frame, the U.S. Army Electronics Command (ECOM) was procuring the Light Observation Helicopter Avionics Package (LOHAP) using basically the same procurement technique. This article will examine the LOHAP purchase in terms of TPPC.

TPPC contemplates the procurement of an item or system in a competitive environment under a contract that provides the maximum definable amount of development, production and support. A shortened version of TPPC could be "contracting for as much as can be defined and competitively priced."

Prior to the total package approach, defense procurement had generally been accomplished by fragmentation of development and acquisition. This fragmentation consisted of successive contracts for development, initial production, follow-on production, and support. Fragmented procurement was usually characterized by inadequate competition for the initial and some of the follow-on production effort. The exigencies of the situation often led to placement of the initial and follow-on production with the developer. In many instances the developer sought to "buy in" on the development and "get well" on the subsequent production. The developer, seeking to enter the program, tended to underestimate costs and optimize technical achievement. This faulty projection of costs and technical achievement often had an adverse effect on Government funding and planning for equipment availability to the field.

The fragmented process has been described as "iceberg" procurement. In buying this iceberg, the Government could see the small portion of the iceberg that was visible above the water. This portion was the development contract with its projection of technical achievement and costs. The balance of the iceberg, which included the long range cost and technical implications of production and support, was not visible. In such situations the Government was locked into a long range program with limited overall visibility.

This kind of situation formed the background for development of TPPC —ideally, the development and acquisition of an item or system under a contract that provides firm commitments for cost, delivery and performance, including the period of operational use. Such a contract would provide the proper inducements to a subcontractor to design and develop economical equipment that would fit the intended need. It would also provide the Government with greater visibility over an entire program and, by centralizing responsibility, would reduce Government-contractor interface.

Under this concept the Government competes and awards a contract providing for as much of the development, production and support as can be defined. In recognition of the extended period to which a contractor is committed to a firm price, provi-

U.S. Army OH–6A light observation helicopter.

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sions are made for cost escalation. Total system responsibility is placed on the prime contractor, thus acting to reduce Government-contractor interface and emphasize prime contractor responsibility. Change-inhibiting clauses are used to combat the cost and schedule impact of excessive engineering changes and, finally, the quantity purchased represents the best estimate of total defense needs for that item. Obviously, the extent to which the contract quantities reflect total requirements bears directly on the successful application of the concept.

In examining ECOM's experience with TPPC, the concept appears to be an amplification of what the Army termed development/production contracts, first used in 1951 and 1952. At that time, the Korean crisis dictated speed up of item acquisition and the development/production contract was an excellent vehicle for this purpose.

Since the Korean crisis, the first major ECOM purchase with the development/production or total package idea was the procurement of the Light Observation Helicopter Avionics Package.

Procurement of LOHAP started as a normal fragmented procurement. Upon presentation of the request for Secretarial authority to negotiate, direction was given to change the development procurement to development/production. This Secretarial direction cited the principal reason as being the desire to obtain competition for the first production quantity. It also recommended the use of a fixed-price or fixed-price incentive fee contract and provision for incremental funding.

An interesting feature of the direction was the mandate that the award be made on the basis of the "best overall" proposal and not on price alone. This reflected the combination of development and production. Normally, production contracts were awarded on price, and development contracts on technical excellence. This dictate to award to the best overall proposal produced an amalgam of the criteria for the award of the two previously separated features, development and production.

The LOHAP procurement was practically concurrent with the C–5A and, during the LOHAP processing, there was little mention of total package procurement per se. In retrospect, it appears that the incorporation of certain additional TPPC features in LOHAP, such as the escalation provisions and the change-inhibiting clauses, could have been considered.

By contracting simultaneously for development and production, the Government was able to obtain the price and other advantages offered by competitive total package procurement. In addition, maintenance considerations were incorporated in the development phase so the contractor was forced to design with maintenance as well as producibility in mind.

The LOHAP purchase covered the development and production of an avionics system which would provide the communication and navigation functions for the light observation helicopter. The system consisted of VHF–FM, VHF–AM, UHF–AM transceivers, an auxiliary FM receiver, an automatic direction finder, a communication control, and the associated antennas for these equipments.

In July 1965, 93 contractors were solicited for a fixed-price incentive contract with incentives on cost, schedule and performance in the development phase, and cost and schedule in the production phase. Six offers were received in September 1965.

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After extensive evaluations and negotiations with all six offerors, a contract was awarded to Sylvania Electronic Systems, Division of Sylvania Electric Products, Inc., Buffalo, N.Y.

Award to Sylvania in the target amount of $16,100,000 was based on its submission of the best overall proposal, combining the highest degree of technical merit and the lowest price. During the negotiation phase the intense competition for this award was evidenced by large scale price revisions.

Subsequent to award, the procurement was reviewed by the Logistics Management Institute (LMI) and favorable comment was made on the "total" aspect of the production quantity purchase and the early incorporation of maintenance considerations. LMI also indicated that greater definition and firm commitments for the logistics and support effort would have further contributed to the "totality" of the purchase.

Looking at the LOHAP total package from a technical standpoint, the combination of development and production provides the contractor with the flexibility to evaluate and make trades between the basic engineering development and production phases. He is required to initiate and schedule at an early stage in the develop-

ment activity his production programming and engineering effort to:

- Establish required automatic assembly facilities.
- Develop new manufacturing methods and processes.
- Establish requirements and controls for use of similar components and assemblies in design and production.
- Establish production fabrication design specifications for use by the design and production engineering activity.
- Schedule facilities for a smooth transition of actions.
- Provide for early introduction of manufacturing personnel into the equipment-build activity.

This early scheduling of the preproduction activities provides the contractor with many additional technical problems to overcome early in the program. However, it tends to focus the contractor's sights and attentions on the ultimate goals of the program, the production of a quality, producible product rather than the development of handcrafted non-reproducible equipment.

The contractor is required to employ sound basic engineering practices and to maximize basic design creativity and initiative to effect a producible and cost effective design to meet the customer's requirement in a specified time period. The sound engineering and design creativity demonstrated in the LOHAP program are depicted in Figures 1 and 2 below.

- Figure 1 shows a typical digital divide by N circuit used in the radio transceivers. Shown above the printed circuit (p.c.) card is a specially designed divide by 10 integrated circuit which will functionally replace the encircled area shown on the p.c. board. This change is expected to reduce production costs on the order of $1,000,000, reduce the overall production complexity of the equipment design, and improve the inherent design reliability and maintainability of the equipment.
- Figure 2 shows the audio amplifier card used in the three radio transceivers. The contractor selected this design approach initially after examining the trade-offs in the use of thick film circuit technology and rejected thick film circuitry as a result of higher costs. His continued examination of this area developed that the thick film approach now offers a competitive cost advantage for use not only in this audio amplifier, but also in the second I. F. amplifier card. It is anticipated that the introduction of these changes will improve the inherent equipment reliability and maintainability, and reduce the weight of the equipment.

The contractor obtains the additional benefit of leverage in this type procurement in dealing with his subcontractors and component suppliers. This becomes an invaluable asset for him in achieving the rigid state-of-the-art design requirements imposed on the program. Achievement of these requirements is invariably dependent on the rapid transition of prototype devices to reliable production forms, or the special tailoring of devices for use in the system or particular equipment. As an example, the contractor has a requirement to procure about 15,000 high power UHF transistors for use in the AN/ARC–116 transceiver production equipment. This respectable order for such a device has generated substantial vendor interest. In addition it has focused the component technology activities, within Government and industry, on the rapid introduction of a device which will replace the present transistor, and will substantially reduce the required number of power transistors for this equipment.

The contract is now 14 months old and the contractor is nearing the end of the development phase. Several discussions on the total package aspects have been held with Walter Serniuk, the Sylvania project manager for LOHAP. He commented that the total package forces the contractor to look at the total job from the outset, and it encourages creativity to simplify design and achieve economies. He believes that it encourages better planning by the contractor for long term application of his facilities and resources.

Long range evaluation of TPPC and its LOHAP application are required to produce meaningful determinations. However, even at this early stage, the LOHAP procurement is considered additional proof that

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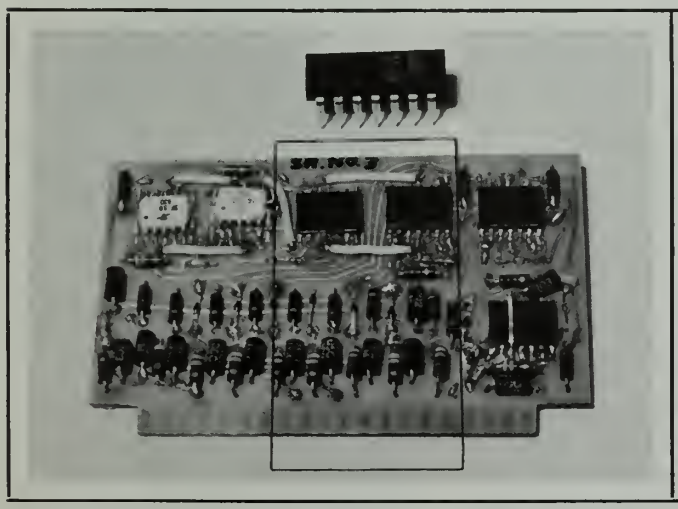

Figure 1
Digital Divide by N—P. C. Card

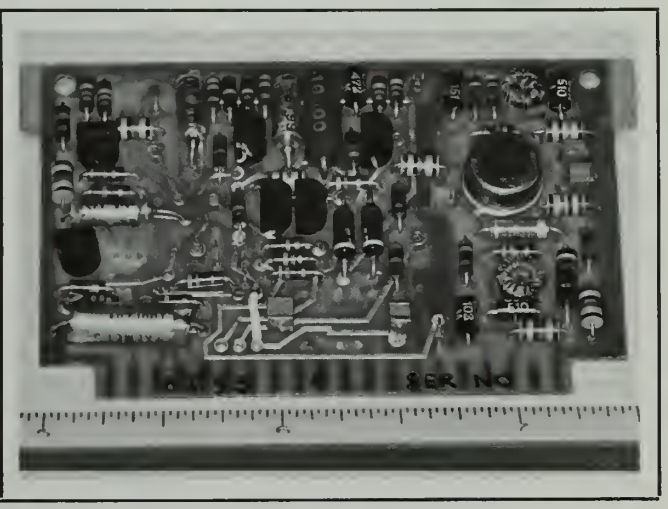

Figure 2
Audio Amplifier P. C. Card

Cooperative Logistics in Italy

Peter E. Feigl

The term "cooperative logistics" is a broad, all-encompassing term which, among others, includes supply support, procurement assistance, maintenance support, storage, contract administration, training, and joint research, development and production programs.

The supply support aspect of cooperative logistics is a key element in the Defense Department's Foreign Military Sales Program. It is normally embodied in a government-to-government arrangement executed at the Defense Minister or Military Department level. Under such an arrangement, the foreign government "invests" and, in return, participates in one or several of the logistic systems of the U.S. Military Departments. The U.S. Military Department, having a given weapon system in its inventory, is responsible for furnishing to the foreign purchaser of the same system the necessary follow-on logistic support which will assure satisfactory operational maintenance support, standardization and utilization of the weapon system.

Previous issues of the *Defense Industry Bulletin* have carried articles, which illustrated the diverse aspects of cooperative logistics between the United States and Germany, the United Kingdom and Canada ("U.S.-German Cooperation Includes Field of Logistics," December 1966; "U.S.-U.K. Logistics Cooperation," March 1967; and "U.S.-Canadian Logistics Cooperation," April 1967.)

In the case of Italy, as with other countries, the concept of cooperative logistics was an outgrowth of the Military Assistance Program (MAP) of the 1950's. As MAP was phased out, the need for follow-on spares and for maintenance of the equipment furnished to Italy under that program was met first through random sales against requisitions. This random approach next led to a more systematic provisioning and stocking of spare parts, the cooperative logistics or supply support arrangement.

The next logical evolutionary step was the procurement of additional or attrition end items for those already in the inventory. Finally, satisfied with the quality and performance of U.S. military equipment, Italy began to look to the United States to meet its present requirements either through purchase of U.S. equipment, adapting U.S. equipment to its own special needs, or coproducing the equipment under license from the U.S. manufacturer. Among the weapon systems and major end items covered under cooperative logistics or support arrangements in Italy are: the M–113 armored personnel carrier; M–55, M–107 and M–109 self-propelled artillery; the M–60A1 tank; the F–104G tactical strike and F–104S all-weather interceptor aircraft; the S–2A aircraft; and Nike and Hawk ground-to-air missile systems.

Cooperative logistics in the fullest sense was achieved with the more recent Italian decision to coproduce M–60A1 tanks, M–113 armored personnel carriers, and F–104S aircraft in Italy. Thus the Italian capacity to coproduce M–113's (over 2,000 to date), which are fully interchangeable with the U.S.-produced version, provides the United States and its NATO allies with an alternate supply source in Europe.

A detailed examination of the Italian M–113 coproduction program will illustrate the value of this and similar programs to the participating governments.

The first fully assembled vehicle was delivered by Italian industry to the Italian Army in less than a year. This feat was remarkable despite the fact that the vehicle was completely assembled from U.S.-manufactured parts and components. Among the many complex operations which preceded the first assembly were license negotiations between manufacturers, procurement actions, dissemination and translation of technical data, tooling up and plant layout, training of technicians and workers, and establishment of the assembly line—all of which had to be done on a more or less concurrent basis. The fact that this was accomplished in such a short time is a tribute to the complete cooperation between the U.S. and Italian project managers and the U.S. and Italian firms involved in the project.

The M–113 coproduction project was based on an "umbrella" government-to-government agreement which:

- Specified what was to be managed and outlined the responsibilities of the parties to the agreement.
- Established decision levels for the settlement of disputes and direct communications channels.
- Provided legal protection for proprietary rights, patents and royalties (in this instance those of the U.S. Food and Chemical Machinery Corp.).
- Fixed the parameters of the program with respect to third countries.
- Placed restrictions on the use and dissemination of technical data.
- Fixed responsibilities for control of the manufactured item (covering control of changes and modifications, thus ensuring standardization and component interchangeability).
- Outlined other important aspects, such as services to be rendered by the U.S. Military Department concerned (in this instance the Department of the Army), and the method of reimbursement for such services.

This basic agreement made easier the development of implementing agreements (industry-to-industry and industry-to-government).

A qualified resident staff of U.S. experts, reporting to the U.S. project manager, was established in Italy on-site to solve day-to-day technical problems as they arose, thus keeping slowdowns in production to an absolute minimum. The availability of such a staff was of tremendous benefit to the Italian coproducers, OTO-Melara of La Spezia (the prime contractor) and FIAT of Turin.

It was found that, since the coproduction program involved full reimbursement for all U.S. services rendered either by U.S. Government personnel or by the U.S. licensor, a

considerable amount of direct contact had to be maintained between the decision-making bodies on both sides.

Adequate provisions also had to be made at the onset to insure standardization of components, emergency supply sources, and responsibility for the performance of the end item. Failure to do so could have caused serious difficulties due to the difference in U.S. and Italian law.

Finally, by the establishment of adequate systems for the preparation and channeling of reports, the administration of the M–113 coproduction program was greatly enhanced.

A similar arrangement has been established for the M–60A1 tank coproduction program. The Italian capability to coproduce M–60A1 tanks obviously will include a spare parts capability as well. This program has been initiated only recently with an initial run for 200 units to be coproduced in Italy. These will supplement 100 M–60A1 tanks which were purchased earlier by Italy from the United States.

The F–104S aircraft coproduction program will require considerable cooperative logistics in its initial stages. With a $400 million program involving 165 aircraft, it can be anticipated that Italian industry will eventually manufacture most of its spares under license. Under this project the Italian prime contractor, FIAT Aviation, will spend some $26 million with U.S. manufacturers (primarily Lockheed and General Electric) for joint research, development and test work which will ensure that Italian industry shares in the technological spin-off to be executed from such work.

Other Italian coproduction programs now pending or under consideration cover the M–109 self-propelled howitzer, Naval Tactical Data Systems (NTDS) units, and SH–3H and CH–47 helicopters.

It can be readily seen that cooperative logistics contribute to the longevity of original equipment while, at the same time, fostering standardization of equipment and providing alternate sources of supply, both of which are essential for any military alliance. Additionally, it can become an important element in promoting the concept of a defense common market. Whenever the work and cost of research and development, testing, tooling up and production can be shared on a free competitive basis, the result will be a stronger alliance by providing the participants with the best weapon system at the lowest cost to the taxpayer. Finally, during the last four or five years, cooperative logistics has helped offset about half of U.S. defense expenditures incurred through the deployment of U.S. forces in NATO countries. In Italy, coproduction programs, both on a government-to-government and industry-to-industry basis, are much in favor and likely to gain in importance. These programs and the concept of cooperative logistics have further strengthened the ties between the U.S. and Italian Armed Forces and between the industries of both countries.

In conclusion cooperative logistics is beneficial to the participants by fostering:

- Standardization of military equipment essential for joint military operations.
- Joint acceptance of strategic and tactical concepts and military doctrine based on the use of common military equipment and munitions.
- Creation of ground, air and naval environments compatible with U.S.-operated equipment.
- Creation of complementary forces from diverse nations.
- Establishment of alternate supply sources.
- Promotion of the defense common market concept.
- Providing industry with the technology it needs to remain competitive in the armaments field as well as the civil sector of the economy.

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Industrial Security Management Course Sessions Scheduled

The Defense Department has scheduled a series of 10 sessions of the Industrial Security Management Course during FY 1968. Purpose of the course is to achieve a common level of understanding, interpretation and application of DOD regulations and directives.

The course is open to security officials of industry who are responsible for the safeguarding of classified information in the custody of contractors participating in the DOD Industrial Security Program. A security clearance of Confidential or higher is required for all enrollees. Company Confidential is acceptable.

Industrial and research organizations interested in sending representatives to the course should inform their cognizant security office and submit the names, addresses, levels of security clearances, and preferred date of attendance.

Reservations will be made on a "first come, first served" basis. Those for whom reservations are made in advance will receive invitations from the Commandant, U.S. Army Intelligence School, about a month prior to the starting date of the session they have selected to attend.

DOD offers this instruction without charge. However, industrial organizations must bear the cost of transportation of representatives to and from the city where the course is held and their maintenance while attending the course.

Following are the locations and dates of the sessions:

Fort Holabird, Md: July 24–28, 1967; Aug. 21–25, 1967; Dec. 11–15, 1967; Jan. 8–12, 1968; March 18–22, 1968; April 8–12, 1968.

Boston, Mass.: Sept. 25–29, 1967.

Chicago, Ill.: Oct. 2–6, 1967.

Denver, Colo.: May 6–10, 1968.

Los Angeles, Calif.: May 13–17, 1968.

Know this man?

Perhaps you don't. But it's a fair bet that employees of the Martin-Marietta Corporation of Orlando, Fla., do. For this man—a member of our Armed Forces in Vietnam—is a close relative of someone on the Martin-Marietta team.

By highlighting the personal interest employees share in each other's sons, brothers and husbands serving in Vietnam—and their mutual desire to turn out the best possible product for their fighting men—Martin-Marietta, a top supplier of weapon systems for the Defense Department, has come up with an unusual way to promote its Zero Defects program.

To provide personal motivation, the company displays posters throughout the plant featuring photographs of servicemen (all relatives of company employees) now serving in Vietnam. The photos are mounted under the caption, "Know this man?" and accompanied by a short explanation of who the man is, where his father, mother, brother, or wife works, and where he is stationed.

At the bottom of each poster is the punch line—the key to the idea's success: "He's just one of the people who depend every day on you and ZERO DEFECTS."

The "Know this man?" campaign started almost by accident. An employee brought in a photo of his son, who is fighting in Vietnam, and asked if it would make a good feature story for the company publication.

The story ran and, as a follow-up, a request for information on any other sons in service was issued. The idea was to do a feature on a number of employee's sons.

The photo-feature and call for additional photos brought an overwhelming response. When space in the company paper ran out, the photos were reproduced in quantity and mounted on large posters and the program was launched.

Now posters are displayed throughout the Orlando plant, and one is specifically placed in the work area of the employee whose relative is featured.

Although the Zero Defects quality improvement program has been in effect since it was originated by Martin Marietta in July 1962, the current poster series has given new meaning to an old concept.

Almost every area of the corporation's huge defense plant has an employee with one or more sons in service. The prominent display of the son's photograph, showing him in uniform—many in combat dress—has had an inspiring effect.

"I had no idea you had a son in Vietnam," is a comment heard many times in the plant. And with the comment comes a renewed dedication to produce the best possible equipment and weapons for all sons in service.

In this plant of 9,000 employees, when someone talks about a quality product, he means it.

Employees in the manufacturing area of the Martin-Marietta plant in Orlando, Fla., strive to turn out Zero Defects products with one of the many bulletin boards within the plant which hold "Know this man?" posters nearby to remind them of their responsibility.

World-wide U.S. Aircraft Inventory FY 1966-1967

The Defense Department has compiled what is believed to be the most comprehensive figures on the U.S. world-wide aircraft inventory ever released to the public.

The inventory summarizes all gains and reductions, both actual and projected, for FY 1966–1967. It includes Army, Navy, Air Force and Marine Corps aircraft, fixed wing and helicopter, in active, reserve and inactive categories.

Reflected in the inventory are actual aircraft losses in Southeast Asia from July 1, 1965, to Feb. 28, 1967, and projected losses in Southeast Asia for the period March 1, 1967, to June 30, 1967. For all aircraft other than those involved in Southeast Asia, the tables reflect actual gains and reductions from July 1, 1965, to Jan. 31, 1967, and projected figures for the period Feb. 1, 1967, to June 30, 1967.

Aircraft listed in the "New Production" column of the tables reflect all new aircraft production, including a small number of research, development, test and evaluation aircraft.

Older aircraft, which are no longer considered part of the combat force but are still in the active inventory, are not listed in their original categories but are carried in "Other Fixed Wing" or "Trainers" column.

The tables also reflect aircraft conversions. For example, F–101's converted to the RF–101 (reconnaissance) configurations are reflected as conversion reductions from the "Tactical Fighter and Attack" category and as conversion gains in the "Reconnaissance" category.

The "Other" column under both gains and reductions includes all transfers to or from the Military Assistance Program (MAP) and between Services. This category also includes gains from reclamation or salvage and reductions due to retirements.

The current inventory differs from previous tables on aircraft losses and deliveries as follows:

- All aircraft in the U.S. inventory, including aircraft in storage, are carried in the current figures, accounting for some 33,000 to 35,000 aircraft.
- In addition to combat and operational losses due to all causes, the tables show reductions due to retirements, conversions, and those aircraft lost to one Service when they have been transferred to another Service. Also included are aircraft transferred from the U.S. inventory to the MAP program.
- The deliveries listed in the past included only new production, conversions and aircraft reworked after removal from storage. Present gain figures indicate new production and conversions, transfers into a Service inventory from the MAP program and aircraft transferred from one Service to another—thus noted as "gained" by the receiving Service. The new tables, however, do not count as "gains" aircraft reworked after removal from storage. (Such aircraft are already in the inventory totals.)
- More of the FY 1968 figures are "actual" and fewer are "projected."

Table 1

Department of Defense Aircraft Inventory

Category	June 30 1965 Active Forces	Reserve Forces [a]	Inactive [b]	Total	June 30 1967 Active Forces	Reserve Forces [a]	Inactive [b]	Total
Tactical Fighter and Attack	4,758	900	603	6,261	5,205	856	183	6,244
Interceptor Fighter	1,246	408	8	1,662	1,008	407	76	1,491
Reconnaissance	554	190	148	892	769	223	132	1,124
Heavy/Medium Bomber	1,107	---	622	1,729	747	---	898	1,645
Transports	3,010	1,033	223	4,266	2,606	953	282	3,841
Trainers	4,748	232	1,100	6,080	4,936	218	1,088	6,242
Other Fixed Wing	4,753	916	602	6,271	4,720	761	480	5,961
Total Fixed Wing	20,176	3,679	3,306	27,161	19,991	3,418	3,139	26,548
Helicopters	5,380	433	410	6,223	8,174	572	597	9,343
DEPARTMENT OF DEFENSE	25,556	4,112	3,716	33,384	28,165	3,990	3,736	35,891

[a] Includes all aircraft in the Air Force and Army Reserves, Air Force and Army National Guard, and operating aircraft only in the Navy and Marine Corps Reserves.
[b] Includes reserve stocks, aircraft on bailment and loan, and aircraft awaiting disposition.

Table 2

Aircraft Inventory Gains and Losses
FY 1966–1967

Category	Inventory June 30 1965	GAINS Production, Conversion Transfers				REDUCTIONS Losses, Retirements, Conversions, Transfers						Inventory June 30 1967
						Southeast Asia		Non-Southeast Asia			Total	
		New Production [g]	Conversions [h]	Other [i]	Total	Hostile [j]	Operational [k]	Operational Losses [k]	Conversions [h]	Other [l]		
Tactical Fighter & Attack	6,261	1,464	97	110	1,671	746	184	374	114	[a] 270	1,688	6,244
Interceptor Ftr	1,662	---	---	---	---	7	2	53	1	[b] 108	171	1,491
Recce	892	288	109	13	410	79	11	52	---	36	178	1,124
Heavy-Medium Bomber	1,729	---	---	---	---	---	---	7	2	75	84	1,645
Transport	4,266	282	2	151	435	31	22	58	112	[c] 637	860	3,841
Trainers	6,080	611	---	163	774	---	---	176	80	[d] 356	612	6,242
Other Fixed Wing	6,271	375	261	377	1,013	132	93	156	160	[e] 782	1,323	5,961
Total Fixed Wing	27,161	3,020	469	814	4,303	995	312	876	469	2,264	4,916	26,548
Helicopters	6,223	4,393	3	64	4,460	363	333	280	3	361	1,340	9,343
TOTAL	33,384	7,413	472	878	8,763	1,358	645	1,156	472	[f] 2,625	6,256	35,891

[a] Consists of 126 retirements, including 88 F–86's; 74 MAP transfers, including 44 A–1's and 23 A–4's; 66 A–1's transferred between Services; and 4 transfers to schools and museums.

[b] Consists of 81 retirements including 77 F–89's; 24 F–89's transferred to other Services and 3 F–89's transferred to schools and museums.

[c] Consists of 410 retirements including 41 C–47's, 55 C/HC 54's, 138 C/KC 97's, and 135 C–119's; 84 Military Assistance Program (MAP) transfers including 33 C/HC–47's, 15 C/HC–54's, 13 C–119's, and 7 C–130's; 136 C–7A's (CV–2's) transferred from Army to Air Force; and 7 transfers to schools and museums.

[d] Consists of 146 retirements including 78 T–33's, 19 T–34's, and 30 TC–47's; 176 MAP transfers including 133 T–33's and 24 T–34's; and 34 T–33's transferred to schools and museums.

[e] Consists of 388 retirements including 122 O–1's, 75 F–6's, 51 F–3's, 27 F–1's, 25 AF–1's and 19 U–6's; 63 MAP transfers including 34 U–18's, 11 U–7's, 8 HU–16's and 6 S–2's; 326 transfers to other Services including 249 Army O–1's transferred to Air Force and 59 AF U–6's transferred to Army; and 5 transfers to schools and museums.

[f] Total other, non-flying losses consist of 521 inter-service transfers, 440 transfers to MAP and 1,664 retirements and transfers to schools and museums.

[g] Includes deliveries of Research Development Test and Engineering (RDT&E) aircraft, where applicable.

[h] Conversion gains and conversion losses between aircraft categories as a result of the modification of the aircraft involved.

[i] Transfers from other services, MAP, and gains from reclamation or salvage.

[j] Aircraft known or believed to have been lost due to hostile action.

[k] Losses due to flying and ground accidents.

[l] Transfers to other services, MAP, and reductions due to reclamation, retirements, and other non-operational causes.

Table 3

Aircraft Inventory Gains and Losses
FY 1966

Category	Inventory June 30 1965	GAINS Production, Conversion, Transfers				REDUCTIONS Losses, Retirements, Conversions, Transfers						Inventory June 30 1966
						Southeast Asia Losses		Non-Southeast Asia			Total	
		New Production [a]	Conversions [b]	Other [c]	Total	Hostile [d]	Operational [e]	Operational Losses [e]	Conversions [b]	Other [f]		
Tactical Fighter & Attack	6,261	522	49	78	649	302	84	185	42	242	855	6,055
Interceptor Ftr	1,662	---	---	---	---	4	---	27	1	80	112	1,550
Recce	892	155	39	7	201	30	5	25	---	19	79	1,014
Heavy/Medium Bomber	1,729	---	---	---	---	---	---	3	1	36	40	1,689
Transports	4,266	143	1	6	150	14	15	27	65	286	407	4,009
Trainers	6,080	247	---	25	272	---	---	83	36	196	315	6,037
Other Fixed Wing	6,271	153	140	185	478	54	41	77	84	351	607	6,142
Total Fixed Wing	27,161	1,220	229	301	1,750	404	145	427	229	1,210	2,415	26,496
Helicopters	6,223	1,857	3	19	1,879	152	133	119	3	174	581	7,521
TOTAL	33,384	3,077	232	320	3,629	556	278	546	232	1,384	2,996	34,017

[a] Includes deliveries of RDT&E aircraft, where applicable.
[b] Conversion gains and conversion losses between aircraft categories as a result of the modification of the aircraft involved.
[c] Transfers from other services, MAP, and gains from reclamation or salvage.
[d] Aircraft known or believed to have been lost due to hostile action.
[e] Losses due to flying and ground accidents.
[f] Transfers to other services, MAP, and reductions due to reclamation, retirements, and other non-operational causes.

Table 4

Aircraft Inventory Gains and Losses
FY 1967

Category	Inventory June 30 1966	GAINS Production, Conversion, Transfers				REDUCTIONS Losses, Retirements, Conversions, Transfers						Inventory June 30 1967
						Southeast Asia		Non-Southeast Asia			Total	
		New Production [a]	Conversions [b]	Other [c]	Total	Hostile [d]	Operational [e]	Operational [e]	Conversions [b]	Other [f]		
Tactical Fighter & Attack	6,055	942	48	32	1,022	444	100	189	72	28	833	6,244
Interceptor Ftr	1,550	---	---	---	---	3	2	26	---	28	59	1,491
Recce	1,014	133	70	6	209	49	6	27	---	17	99	1,124
Heavy/Medium Bomber	1,689	---	---	---	---	---	---	4	1	39	44	1,645
Transports	4,009	139	1	145	285	17	7	31	47	351	453	3,841
Trainers	6,037	364	---	138	502	---	---	93	44	160	297	6,242
Other Fixed Wing	6,142	222	121	192	535	78	52	79	76	431	716	5,961
Total Fixed Wing	26,496	1,800	240	513	2,553	591	167	449	240	1,054	2,501	26,548
Helicopters	7,521	2,536	---	45	2,581	211	200	161	---	187	759	9,343
TOTAL	34,017	4,336	240	558	5,134	802	367	610	240	1,241	3,260	35,891

[a] Includes deliveries and losses and retirements of RDT&E aircraft, where applicable.
[b] Conversion gains and conversion losses between aircraft categories as a result of the modification of the aircraft involved.
[c] Transfers from other services, MAP, and gains from reclamation or salvage.
[d] Aircraft known or believed to have been lost due to hostile action.
[e] Losses due to flying and ground accidents.
[f] Transfers to other services, MAP, and reductions due to reclamation, retirements, and other non-operational causes.

American Industry Takes Cost Reduction Seriously

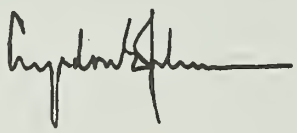
THE WHITE HOUSE

WASHINGTON

February 11, 1967

This memorandum from Secretary McNamara tells how American industry is conserving Defense resources. I believe you will find it worth your time to read it.

Secretary McNamara states that 75 contractors reported cost reductions of $1.8 billion in two years on their Defense sales. This is a most gratifying response to my request that our Nation's Defense community help us reduce costs.



Three years ago, you asked major defense contractors to step up their efforts to reduce costs under defense contracts. At the same time, you asked me to take their cost reduction efforts into account when making future source selections and in determining profit and fee rates on noncompetitive negotiated contracts.

A recently completed analysis of progress under the Defense Contractor Cost Reduction Program shows that industry has responded vigorously to your request.

Participation.

Seventy-five parent companies (listed on page 11) actively participate in the program, and 183 of their plants or divisions report to us semiannually on their cost reduction accomplishments. These companies received over 50 percent of the $33.5 billion awarded in contracts by this Department in FY 1966.

Savings.

In the two years ending June 30, 1966, these companies reported cost reductions of $1.8 billion on their defense sales, exclusive of firm fixed price contracts. Savings in FY 1965, the first year of formalized reporting, totaled $811. Savings in FY 1966 totaled $996 million.

Benefits to Defense.

These savings benefit the Defense Department by:

- Reducing payments to contractors under cost-reimbursement contracts.
- Enabling the Defense Department to share in savings under contracts with incentive-type arrangements.
- Providing a lower base of experienced costs for reference in pricing out subsequent contracts.

These contributions by defense industry are impressive evidence of its concern that the Government receive a dollar's value for every defense dollar spent.

Cost Reduction Examples.

The following examples are representative of the thousands of cost reduction actions being taken by contractors in the Contractor Program.

Value Engineering. Douglas Aircraft Division of Douglas Aircraft Company, Inc., reported a savings of $6,191,366 by redesigning the canopy of the TA–4E aircraft. The canopy was reengineered to reduce its thickness, eliminate an unnecessary electric heating element, and reduce the number of seams over the pilot's head from two to one.

Technical Data. Western Electric Co., Inc., recently reported the following savings:

- The preparation of composite parts' lists to utilize repetitive information formerly shown on separate lists saved $113,000.
- The incorporation of supplemental data on draftsman's layout drawing instead of preparing separate formal documentation saved $757,000.

Uses of Excess. The Aerospace Group of The Boeing Company reduced costs by $383,137 by screening equipment requirements against excess inventories. One hundred and thirty-nine items of excess equipment, identical or comparable to items needed by requesting units, were furnished in lieu of new procurement.

Packaging. The Lone Star Division of Day and Zimmermann, Inc., reported packaging, preserving and

packing savings of $1,019,600 for the six-month period ending June 30, 1966.

• Modification of packaging specifications to allow use of material already on hand to pack M26 hand grenades and reuse of packing material in which M557 ammunition fuzes were received, instead of procuring additional material to meet the prior specifications, saved $676,024.

• Use of wood skids in lieu of pallets for 105mm cartridges saved $262,400.

Technical Manuals. Gyrodyne Company of America, Inc., reported a variety of actions which saved $81,200 in technical manual costs in FY 1966.

• Elimination of unnecessary symbols on wiring diagrams saved $2,063.

• Preparation of final copy directly from handwritten work eliminated a typed rough draft and saved $6,398.

• Combination of three publications into one saved $1,004.

Automatic Data Processing. Northrop Corporation reduced costs $350,468 by applying electronic data processing techniques to its purchase order, procurement management information, and materiel industrial and standards systems. Improved utilization of data processing reports permitted the corporation to reduce manpower requirements in one of its groups by more than 35 percent—saving an additonal $117,540.

Administration. The McDonnell Corporation saved $941,120 by a recent company-wide campaign against unnecessary paperwork. The drive eliminated 408 automated reports, over 1,200 report copies, 76 manual reports and 199 forms. In addition, 237 forms were standardized. Fifty-four tons of paper were disposed of by file cleaning alone.

Industry Response.

Today, defense industry is conscientiously participating in the Defense Contractor Cost Reduction Program. Most contractors consider it imperative to have a cost reduction program to remain competitive and realize fair profits. Many had programs long before the Defense Department program was started, but all seem to have intensified their efforts during the last three years.

Lockheed Aircraft Corporation is the largest defense contractor. Lockheed's Annual Report to Stockholders dated March 4, 1966, discussed its costs reduction program:

"All nine operating companies surpassed their goals in cost reduction. After realizing total savings of $117 million in 1964 in the first year of the intensified industry campaign sponsored by President Johnson and Defense Secretary McNamara, we knew that the enthusiasm of the initial push would be hard to sustain. Yet we bettered our 1964 performance with corporate-wide savings of $132 million, enabling us to strengthen our competitive position, pass along substantial savings to the U.S. Government and improve our profits. These savings come from a variety of techniques—process innovations, automation, computer aids, Zero Defects, value engineering, and more efficient work procedures."

Cost reduction techniques are being applied by companies to their civilian as well as their military work. A Wall Street Journal survey reported that these techniques are also being used by many firms not directly connected with the defense program. The Vice President for Purchasing of one of the major airlines (not a participant in the program) recently wrote us:

"Because of the widespread impact of your program, we are finding broader acceptance for our own cost reduction efforts. Other corporate purchasing departments, I am sure, are finding similar benefits from your program. The American consumer and taxpayer cannot help but benefit from this organized effort to reduce costs."

The Defense Contractor Cost Reduction Program has had the uncompromising support of the top executives in industry and the Defense Department. I am confident it will continue to receive such support.

Alphabetical Listing of Parent Companies Participating in Defense Contractor Cost Reduction Program

AAI Corp.
Aerojet General Corp.
American Air Filter Co., Inc.
ARO, Inc.
Atlantic Research Corp.
AVCO Corp.
Beech Aircraft Corp.
Bell Aerospace Corp.
The Bendix Corp.
The Boeing Co.
Burroughs Corp.
Collins Radio Co.
Communications Systems, Inc.
Computing and Software, Inc.
Control Data Corp.
Cornell Aeronautical Laboratory, inc.
Curtiss-Wright Corp.
Day and Zimmermann, Inc.
Douglas Aircraft Co., Inc.
Dynalectron Corp.
Electronic Communications, Inc.
Electro-Optical Systems, Inc.
FMC Corp.
The Garrett Corp.
General Dynamics Corp.
General Electric Co.
General Motors Corp.
General Precision, Inc.
Goodyear Aerospace Corp.
Grumman Aircraft Engineering Corp.
Gyrodyne Co. of America, Inc.
Hayes International Corp.
Hercules, Inc.
Honeywell, Inc.
HRB–Singer, Inc.
Hughes Aircraft Co.
Hycon Mfg. Co.
IBM Corp.
International Harvester Co.
ITT Corp.
Interstate Electronics Corp.
Johns Hopkins University
Kaiser Jeep Corp.
Kaman Aircraft Corp.
Keltec Industries, Inc.
Lear Siegler, Inc.
LTV, Inc.
Litton Systems, Inc.
Lockheed Aircraft Corp.
Loral Corp.
Marquardt Corp.
Martin-Marietta Corp.
Massachusetts Institute of Technology
McDonnell Corp.
Melpar, Inc.
The MITRE Corp.
Newport News Shipbuilding and Dry Dock Co.
North American Aviation, Inc.
Northrop Corp.
Olin Mathieson Chemical Corp.
Page Aircraft Maintenance, Inc.
Pan American World Airways, Inc.
Philco-Ford Corp.
Radiation, Inc.
Radio Corp. of America
Raytheon Co.
Remington Arms Co., Inc.
Sperry Rand Corp.
Sylvania Electric Products, Inc.
Thiokol Chemical Corp.
TRW, Inc.
United Aircraft Corp.
Vitro Corp. of America
Western Electric Co., Inc.
Westinghouse Electric Corp.

FROM THE SPEAKERS ROSTRUM

Address by Hon. Robert N. Anthony, Asst. Secretary of Defense (Comptroller), to American Ordnance Assn., Washington, D. C., March 16, 1967.

Hon. Robert N. Anthony

The Paperwork Problem

Not many people like paperwork—or at least not many people will admit they like it. Since I am going to talk about some of our efforts to reduce the amount of paper that flows between contractors and the Defense Department, my remarks should theoretically be popular.

But—as is the case with many broad propositions—it is a fact that although most everyone favors reduction of paperwork in general, there is a great difference of opinion as to exactly what should be done as a practical matter. . . .

First, let me say that we do recognize that there is a problem—a serious problem. Over the years, each manager of a major weapon system project has tended to develop his own system for collecting data on plans, measuring and reporting progress against those plans, and recording actual experience. The result was proliferation—of systems, of reports and of acronyms. Fertile imaginations and active ingenuity accomplished tasks which were worth doing—and they got results. This proliferation is not good, and we know it is not good.

But having said this, I want also to point out that there is another side of the coin. Defense managers do need information. It is their responsibility to see to it that the best possible weapon systems get developed, that these systems be produced on time, and that the Government pays only a reasonable price for them. So we do need systems, and they must be carefully worked out systems, that will show the Government manager what is going on, where the trouble spots are, and do this accurately and promptly.

Managers in DOD—the Secretary of Defense, his principal assistants, the senior officials of the Military Departments and the Defense Agencies, the system managers—must represent the public interest. DOD management cannot duck its responsibility to guard national security and provide prudent stewardship of public resources, and we must provide the means.

In recent years, DOD has emphasized competitive procurement and incentive contracting, rather than sole source and cost plus fixed fee (CPFF). These changes have been tremendously helpful, but they do not, of course, automatically insure that quality, delivery time and costs are what they should be. We must continue to receive information that gives us the necessary visibility on these important questions.

We, therefore, will always need reports from contractors. But we believe that substantial improvements can be made in the nature of these reports, and this is the program on which we are now working.

At present we are concentrating on large programs. These efforts we call SAIMS—the Selected Acquisitions Information and Management System. SAIMS development has already resulted in the elimination of new requirements for the Defense Contractors Planning Reports (DCPR), the report of Costs Incurred on Contract (DD Form 1177), the Financial Management Report (DD Form 1097), and several other special forms peculiar to individual Services.

The development of SAIMS is taking place in three principal areas. The first, to provide an economic information system, is designed to meet the requirement for information about the activities of the work force of our major contractors which enables us to assess the impact of the Five Year Defense Program on industries and geographical areas. Some economic impact data have been collected in the past using the DCPR and a variety of other reports. The uniform, streamlined approach was begun in December 1965, and the current sample includes 422 plants. The data provide the basis for more responsive, more accurate answers to questions which reflect the concern of all branches of this Government for knowledge of the impact of the dollars which are spent in the national defense.

The second area deals with the problems of making cost estimates. Particularly where new systems are concerned, we have been handicapped by the lack of comparable cost data on previous programs for use as a basis of estimating the cost of the new program. We need such estimates in order to make rational choices among competing development alternatives, to estimate our funds requirements, and to use as a cross check against contractor estimates in the negotiation process.

We have developed a new system for collecting the data needed for such

estimates. It is called the Cost Information Report (CIR). CIR provides a uniform means of collecting historical costs for contracts which are part of major weapon system programs. Cost analysis organizations operated in the Military Departments receive, process, store and use CIR and other data which are stored in the local data bank.

CIR data are not collected until specific approval of the Office of Secretary of Defense is granted. Instead of permitting system managers to ask for whatever information they wish, we now require that all proposals for CIR data be reviewed and approved by the Office of the Secretary of Defense. To date, 24 of the CIR data plans have been reviewed, with 11 more expected during 1967. Sixteen plans were approved in a modified form—11 for aircraft systems and five for missiles. One proposed plan was turned down because is was not considered to be a reasonable requirement, and seven are "in process."

The use of the CIR system was approved by the Bureau of the Budget in April 1966. At present, its coverage is limited to aircraft, missile and space systems. Our plans envision an expansion in the near future to ships, ground electronic systems and armored vehicles.

The third part of the SAIMS effort has to do with the information that is required by project managers and by higher levels of DOD management, so that they can monitor the contractor's performance. Any such system focuses on three aspects of performance: quality, schedule and cost. A great variety of systems and reports for this purpose has been developed over the years by various agencies in DOD.

Our attack on this problem is radically different from that used hitherto. Instead of prescribing a set of reports and rules for filling them out, and requiring that the contractor set up a system that will produce the figures that must be entered on these reports, we are taking the opposite approach: obtaining our reporting requirements from the contractor's own system, rather than making him operate a system just to satisfy our requirements. This approach recognizes that there is no such thing as the one best system; that, although two contractors may have different internal control systems, they may be equally good. If a system provides the information that a contractor needs to manage his own operations, it should also be able to provide the information needed by DOD managers.

Thus, rather than specifying the system, we shall specify the criteria which a constractor's system must satisfy, and stand ready to accept any system that meets these criteria.

The essence of the criteria is that the contractor should be able to identify, plan and authorize work and the estimated cost of this work; and measure actual costs incurred, the costs which should have been incurred, and the output of work accomplished. He could then evaluate performance against plan to assure that the plans are being followed or that deviations quickly come to light. The criteria call for the identification of the specific tasks required to accomplish the contract and the designation of responsible people who must exercise control. There must be planning of the resources which will be used, explicit scheduling of the work required, accounting for costs incurred, and explanations of the variance from plan.

Note the difference between specifying criteria and specifying a system. We will no longer say to a contractor: "You must use PERT." Instead, we will say, "You must have a system that meets certain criteria. Various versions of PERT meet these criteria. If you want to use PERT, or some part of PERT, fine. If you prefer some other system, that is all right with us, just so long as it meets the criteria that any good system should meet."

The data requirements of the Government will be met from the same pool of data which serves contractor management. Normally, our requirements will be for summary information from the contractor's own reports, since the detailed information will be available in the contractor's internal system if circumstances should require it. We must, of course, assure that the data will be available when needed and that the data we are provided are valid, timely and useful.

The development of this part of SAIMS has been under way for some time, with the active participation of Government (including National Aeronautics and Space Administration, Federal Aviation Agency and the Atomic Energy Commission) and industry (through the Council of Defense and Space Industry Associations). This summer we plan to issue implementing instructions for installing planning and control system requirements in large Government contracts. These instructions will contain:

- Criteria for the contractor's management control system.
- Procedures and standards for evaluating the contractor's proposed system during source selection.
- A list of maximum data requirements from which the Military Departments will select items they choose to require from contractors.
- Procedures to be followed in testing the operational performance of the contractor's system.

We have been encouraged by the progress made so far. To some we may seem slow but, as I said at the beginning, efforts of this kind are not easily accomplished. The criteria must be written in such a way that they do not unduly restrict contractors on the one hand, nor permit sloppy systems to slip through on the other. Every phrase has to be argued about by all the parties concerned. But the end is in sight, and the final product will, I think, be something that industry will like much better than what we have now.

Address by Gen. Howell M. Estes Jr., USAF, Commander, Military Airlift Command, at the National Symposium on Better Management Information and Reporting, National Archives and Records Service, Washington, D.C., Nov. 1, 1966.

Management Information Management

It has been said that often a good question is more important than a good answer.

The best answer in the world too often does not relate directly to the question that should have been asked. But the right question forces and focuses attention squarely where it belongs. This concept goes back at least as far as Socrates, whose teaching consisted of asking the right questions in a logical sequence. Today, the basis

of all problem solving is the matter of identifying the problem.

One pointed question that has come down through the centuries is from the poet Juvenal. "Who," he asked, "is going to guard the guards themselves?"

My primary question today is in a similar vein, namely: "Who is going to manage management information?" I think this is a good question; in fact, one of the vital questions of our time. Our hosts of the National Archives and Records Service, in the very act of convening this symposium, would seem to be asking precisely that sort of question. I am pleased and honored that they have asked me to be a part of this distinguished assemblage.

To assure you that I am necessarily sensitive to the problems of management in general, and particularly to those of management information, let me briefly state the three guises in which I appear before you. These are: a military commander, a Government manager, and a man with a business to run.

First, you see the commander of the Military Airlift Command (MAC), a major command of the U.S. Air Force. Our principal mission is to provide strategic, combat and specialized airlift services for all DOD elements and some other agencies of the Federal Government—up to and including the President. Our command—MAC—is also responsible for such other missions as Aerospace Rescue and Recovery; Air Weather; Aerospace Audio-Visual services, including combat photo document, aerial photo mapping, geodesy and gravimetry; and Aeromedical Evacuation, both inter-theater and domestic. These services are also performed for other agencies besides the Air Force.

Secondly, MAC is the operating agency through which the Secretary of the Air Force discharges his responsibility as DOD Single Manager for Airlift Services. As Executive Director of that agency, I am, therefore, a Government manager, in a somewhat broader context than the usual military commander.

Thirdly, what we call "common user airlift" is financed under an Air Force Industrial Fund. Thus a portion of my fiscal responsibility is more commercially oriented than is the case with most military commanders. This is why I say that I have a business to run.

The responsibilities outlined in that little thumbnail sketch help me to remain a very industrious student of management and management information.

In addition, the aeronautical arts and sciences are currently being revolutionized, and so we have on the horizon a genuine revolution in airlift. The foundation of this revolution is grounded upon such aircraft as today's jet cargo C–141 Starlifter, and tomorrow's giant C–5.

The true thrust of the revolution, however, will be found in wholly new concepts and methods of operating, and in completely new and radical ways of exploiting the great productivity, flexibility and responsiveness of these new aircraft. That revolution is never going to take place without a wholly new approach to management—to the information that each level of management is going to require.

Gen. Howell M. Estes, Jr., USAF

These two airplane types, by coincidence, also illustrate the dominant problem of this symposium.

The C–141 has a maximum structural payload capacity of 35 tons. Keep that figure—35 tons—in mind for a moment.

Next we come to the C–5; five contractors competed for the development and production contract—three for the airframe and two for the engine. In reply to the Air Force Request for Proposal (RFP), the five competitors sent in an aggregate of 240,000 pages —not counting any copies. Since 30 copies of each proposal were required, the total weight of the paper submitted was 35 tons—the maximum payload of today's C–141.

It took more than 400 Air Force experts five months to read and evaluate that mass of data. This, to me, hardly represents any tremendous progress in the management of management information.

One reason is that we didn't know exactly what question to ask— so we asked far too many in our RFP. After that exercise, we asked ourselves some very pertinent questions.

Were we not, for example, asking for too much detail on matters which should properly be the concern of the contractors? Why did we need 7,000 pages of cost data when this was a price competition and the contract was fixed-price-incentive? And were we not asking for too much detailed design, rather than simply specifying performance requirements and letting the winning competitor achieve them in his own way.

True, these questions were asked after the 35-ton fact. But they were asked and they are good questions, which should help us to manage management information a lot better next time we go out with an RFP.

I think we also have to acknowledge that all questions about management information are somewhat after the fact. We are already well into the age of information systems, quasi-systems, pseudo-systems, unrelated masses of computer hardware, and far too many types and classes of software. But our management of information has by no means improved to the same extent that the systems have multiplied.

If we seem to be drowning in a flood of information, our main hope may be illustrated by the story of the layman who witnessed the dedication of the 200-inch telescope at Mount Palomar in 1948. He sidled up to the Chief Astronomer and said:

"Modern astronomy sure makes man seem insignificant, doesn't it?"

"Yes," the scientist replied, "but don't you see—man is the astronomer."

Similarly, if we are drowning in information, it is a flood of our own making and, therefore, our own creature to control, manage and use for our own purposes. The word "purposes" hints at one solution for con-

trol—goal orientation—and I will address the significance of goals to management information a little later.

First, I would like to outline what I see as some of the basic problems; then, after a few words on goals, I will suggest what I feel is the framework for at least one approach to the answer.

The first problem, rather than being peculiar to management alone, is universal—the very fact of the information explosion. In science alone, the growth of knowledge has been astronomical. DaVinci could say, in the 15th century, that he was familiar with the entire body of scientific literature existing at that time. Even as late as the 19th century, Gauss had a full grasp of every branch of mathematics.

Today no scientist—and this includes 90 percent of all the scientists who ever lived—can hope to keep abreast of even a small percentage of the work published in his own sub-sub-branch of his particular discipline.

In fact, it has been estimated that it is cheaper to re-do a technical project—if the cost is less than $100,000—than to go through the process of trying to learn if someone has already solved the problem. Thus the question boils down not so much to one of too much information but of too much information that is too difficult or expensive to find.

The second problem arises from the rapid growth and the increasing complexity of the areas which have to be managed. The order of magnitude of effort I mentioned in managing the revolution in airlift is only a single example. Everyone in commerce, industry, engineering, science, the professions and Government feels the force with which the growth curves are pulling apart. The things we have to manage are growing geometrically, while our knowledge of how to manage seems to increase only arithmetically at best. Thus there is more to manage, and more information to manage it with, but "more plus more" seems to add up to less in the way of control.

Third, there is the constantly increasing speed with which decisions must be made. Instant communications over more and more channels, the speed of travel and distribution and the rapidity with which information is generated, all allow less and less time for reflection and deliberation. A transatlantic cable contains 75,000 tons of copper wire, while Telstar handles more channels of communication more effectively with less than a ton of materials. But there has been no matching order of improvement in man's ability to absorb all these additional inputs and come up with an instant output—a decision.

Fourth, the common information needs of managers have not really been clearly identified. There has been more emphasis on how information should be presented than on what information is required to begin with. This, too, is related to the question of goals which, as they set the limits of a playing field, can also delimit and contain the profusion of information, and determine what is "out of bounds."

Fifth, there is a great need for a vertical information structure with a common data base. Decision is essentially the apex of a pyramid built on a broad substructure of alerting, exploring and analyzing. Each level of the structure must have access to a common base of information—a data bank, if you will. To whatever extent a general purpose digital computer can quickly and accurately mechanize a great portion of the fundamental processes, to that extent will the manager be able to make better and more timely decisions.

But if the computer has in a sense solved some portion of this fifth problem—or any of the others—it has also spawned a sixth and perhaps most critical problem.

An old Danish proverb says that prediction is difficult, particularly when it pertains to the future. Thus, when the primitive ENIAC computer was built in 1946, the fact that the thing worked seemed to be a sufficient end unto itself. The mathematicians and engineers at once saw a means of solving what had once been impossibly long equations. But how many saw that ENIAC really was the rudimentary beginning of a potential revolution in the information sciences?

The first automobiles were called "horseless carriages" and that is precisely what they looked like, designed for tradition rather than function. In the same way, the first computers were seen as faster calculating machines or more copious filing systems. And so today, 20 years after ENIAC, we are, in effect, using third-generation computers for bookkeeping and filing.

The essence of the sixth problem is this: We are doing without electronic brains what the neurophysiologists and psychologists tell us we do with our human brains—utilizing them at a small percentage of their actual capacity. We look at a machine that can carry out fantastically rapid arithmetical and logical operations and fail to see an ingenious tool that can and must be usefully integrated into a full-spectrum management information system.

Dr. Alain Enthoven, Assistant Secretary of Defense (Systems Analysis), has said this:

". . . The systems analysis approach bears no essential relationship to computers at all. . . . This shouldn't be surprising, because the really difficult and important part of doing a good analysis is not the computation; it is formulating and defining the problem, clarifying the objectives, and determining which assumptions ought to be considered."

the information explosion

Although he was speaking specifically to systems analysis, I would think Dr. Enthoven's statement bears with equal validity upon the entire problem of management information systems. What he was addressing particularly was the necessity for setting goals.

In my own opinion, goals which are not in some way measurable are not true goals, since there is no way for us to know whether we have actually attained them or not, or how far short we may have fallen, or how to close the gap between what we meant to achieve and what we did accomplish.

For a single analogy, we might think of servomechanisms—machines for which man sets a goal and which then tend to regulate themselves in achieving and holding that goal with a fair amount of stability. Take, for example, a furnace thermostat and an aircraft autopilot.

In the one case, man sets the thermostat for a desired temperature and after that his house should remain within tolerable limits of that temperature. In the latter case, the human pilot feeds a desired set of directions into the automatic pilot, and the autopilot will then maintain the aircraft satisfactorily close to those parameters.

However, with the thermostat, you don't say to the gadget on the wall, "I'd like to remain warm and comfortable, so take care of it." What you do is set the pointer to a specific degree of temperature.

By the same token, you don't tell the autopilot that you'd like to get to Milwaukee in the least time at a safe altitude. Instead you set the dials for a specific compass heading, altitude and attitude, and the machine will keep you a few degrees to either side of these figures until either the gyros have drifted too much or you crank in a new set of numerical instructions.

In either case, the goals must be specified in definite quantitative terms or there is no way for the mechanism to know what you desire from it. The same is true of organizational goals.

But there is one fundamental difference. When the house gets warmer or colder than the selected temperature, the control mechanism opens or closes the circuit that turns the furnace off or on. When the autopilot senses that external forces are pushing the aircraft off the preselected path, it actuates servomotors to move the control surfaces and correct the discrepancy. Man, having once set the initial conditions, is out of the loop, and we have a closed-loop feedback system.

In an organization, on the other hand, the loop is open, with only the manager to complete the feedback circuit. The mechanism is not self-regulating. When goals are not being achieved, the manager must know it, he must know why, and he must know what corrective action to take. For all of these, he needs information.

In setting goals, then, we determine which things spell the difference between success and failure. Having done that, we have decided which things require the attention of management.

Thus management information which does not relate to purpose—usually expressed in goals—has little significance. So we might say that goals express purpose in terms of what or how much we expect to achieve in a given period of time.

Expressing goals quantitatively provides a language for relating actual results to these projected goals. So we need information for—at the very minimum—these three purposes: setting goals, scheduling events to achieve these goals, and measuring results against the goals. Then, if there is any divergence between achievements and goals, the manager needs further information to determine the reasons. He can then take corrective action, either to improve performance or, if necessary, to recast his goals in a more realistic mold.

Thus an organization is designed for a specific purpose or set of purposes, and managed in such a way as to achieve those purposes. To know what the purposes are, to know whether they are attainable, to organize for their attainment, to know whether they remain valid in the dynamism of changing situations, to know whether they are being achieved, and above all to know why or why not, for these management objectives we must have information.

Most of all, however, we need very good information on how much of what kind of information our particular purposes really demand.

All of this means to me that we must have a manager of management information.

Classically, the functions of management encompass planning, organizing, directing, coordinating and controlling. A case can be made for the thesis that each of the first four functions must be carried out with control in mind. But control is not an end in itself, nor can it be performed in a vacuum.

That, again, is why it is so essentiol to establish goals, because only in reference to goals does control have any meaning or any possibility of being achieved.

For our purposes today, we might concentrate on planning and controlling as the two most important functions of management. For simplicity's sake, we can define planning as the setting of goals, and controlling as the means of achieving them.

Planning, therefore, must anticipate that control is a categorical necessity. Any type of planning which does not look ahead to control is unrealistic. Consequently, it is essential in planning to identify the information that will be required for control.

The information itself, then, if it is to be managed, must also be planned, directed and controlled.

Planning, in this case, includes identifying the information requirements of each echelon of management, and developing uniform methods of responding to these needs. It covers the necessary research, analysis, and design and development of the management information system.

In the area of directing, the objective is to put the system to work. This means assignment of information responsibilities at all levels and, of the utmost importance, the developing of attitudes among the functional staff through which it can grasp a corporate picture of what is going on.

In control, finally, the prime objective is a system for measuring the effectiveness of the management information system itself. From this point, as with any control mechanism, there is a feedback path right back to planning.

In a typical corporate organization, the data base serving the entire corporate body tends too often to be compartmentalized. Each functional manager, in effect, draws from his own parochial hoard of information. He then further filters, isolates and manipulates the data before presenting it to the corporate manager in the guise of useful information.

Thus we can visualize the corporate manager as being surrounded by his functional managers, each talking to him, in effect, in a different language.

What we need, however, is a single common data base for the entire corporate body. Each of the functional managers draws, as required, from this bank. Naturally, each will perform certain operations on the data before passing it up. Here it is useful to think of a little quasi-algorithm, which goes:

Data + Analysis = Information

Information + Judgment = Decision

The first equation means that the functional manager analyzes portions of the common data base in the light of his own department's functions, knowledge and goals. But he has also

got to be aware of the relationship of his information to that of all the other functional managers—and of its impact upon corporate goals.

This awareness—this substitution of a corporate overview for a parochial purview—is the province of the management information manager. It is one of his functions to see that manager A, B, C, D and E, etc., all draw from the common data base. He, then, monitors all upward reporting to assure that the data which has been analyzed into information is related—in a common language and with a common purpose—to all other information from the other functional managers.

A hypothetical example will show the system in action. We will concentrate on managers A, D and E who are responsible for, respectively, Personnel Procurement and Training, Procurement, and Research and Development.

This organization, let us say, is procuring a major new weapon system. Manager D, in charge of procurement, reports that this process is on schedule, and he anticipates no major problems. Manager A, who has to procure and train the people to operate and maintain the system, is likewise on target and sees no trouble ahead.

Manager E, the research and development man, is developing a training device which A will have to use to train his people in the system D is procuring. Manager E reports that his entire program is going well.

And it is—from his point of view. The training device is far behind schedule, but it only represents, say, .1 percent of Manager E's total program. So, not relating this small proportion of deviation to the profound impact it will have on the scheduled operation of the entire weapon system, he does not report trouble. He does not see the trouble.

The information manager, however, in monitoring the entire program and tying all the information together, would have seen the warning signs long enough in advance to forestall a major problem. One of the most useful devices at his command in this area is "logic diagramming," of which the well-known PERT network is one example.

In my own headquarters, the Director of Management Analysis functions as the management information manager. The Management Analysis staff also has these responsibilities: It is a servant to the rest of the staff and to the commander; it acts as an educator in management techniques; it is a helper and consultant in analyses conducted within other staff agencies; and it is, above all, a catalyst for speeding up the continual process of analytical improvement.

These functions and duties are, of course, delegated. The responsibility itself cannot be delegated; in the last analysis, the burden resides with the top manager. In my own case, I am taking every means I can conceive of to do two basic things: to promote the growth of genuine analytical capability at all levels of management through the command and to achieve a fundamental, command-wide understanding of the tremendous necessity for that kind of capability.

This is easily said, but by no means automatically done. Like aeronautics and airlift themselves, management is undergoing a revolution, which is being vastly accelerated by electronics. And every revolution has to overcome a tremendous amount of inertia before it becomes self-sustaining.

Max Planck, who himself helped to revolutionize physics, put it this way: "A new truth does not triumph by convincing its opponents and making them see the light, but rather because its opponents eventually die, and a new generation grows up that is familiar with it."

So there is no doubt great hope in the new generation of management that is growing up with electronic computers. But we cannot wait for them to take over, or we will have long since drowned in the flood of information. I would like to conclude, then, by recalling what Norbert Wiener said when someone asserted that man could always pull the plug on the machine before the machine could control man.

With a machine doing millions and billions of calculations a second, Dr. Wiener replied, the man will have been overwhelmed and bypassed long before he can ever know it is time to cut off the power.

Information, including management information, is growing by the microsecond and even the nanosecond. We cannot turn off the flow. We had, therefore, better learn to control it—and we are already running late.

Calendar of Events

June 11-15: American Nuclear Society Meeting, San Diego, Calif.

June 12-14: American Institute of Aeronautics and Astronautics Commerical Aircraft Design and Operation Meeting, Los Angeles, Calif.

June 14-16: 16th Annual Federal Government Accountants Assn. Symposium and Exposition, Sheraton Park Hotel, Washington, D.C.

June 19-21: Heat Transfer and Fluid Mechanics Institute, La Jolla, Calif.

June 20-23: Data Processing Management Assn. Meeting, Boston, Mass.

June 20-26: Society of Nuclear Medicine Meeting, Seattle, Wash.

June 25-30: American Society for Testing Materials Meeting, Boston, Mass.

June 28-30: Joint Automatic Control Conference, Philadelphia, Pa.

July 5-8: National Society of Professional Engineers Meeting, Hartford, Conn.

July 16-29: Engineer Seminar, Fort Belvoir, Va.

July 16-29: Nuclear Science Seminar, Oak Ridge, Tenn.

July 17-19: Reliability and Maintainability Conference, Cocoa Beach, Fla.

July 17-21: American Institute of Aeronautics and Astronautics Propulsion Joint Specialist Conference, Washington, D.C.

July 19-21: National Classification Management Society Annual Seminar, Washington, D.C.

July 23-Aug. 4: Mobility Seminar, Detroit, Mich.

July 27-30: Jaycee International Air Show, Gen. Mitchell Field, Milwaukee, Wis.

Aug. 6-9: American Society of Mechanical Engineers Heat Transfer Conference, Seattle, Wash.

Aug. 13-17: Energy Conversion Engineering Conference, Miami Beach, Fla.

Aug. 14-16: American Institute of Aeronautics and Astronautics Guidance Control and Flight Dynamics Conference, Huntsville, Ala.

Aug. 28-30: Spacecraft Issues for Missions of the 70's Meeting, Olympic Hotel, Seattle, Wash.

Aug. 29-31: Assn. for Computing Machinery Meeting, Washington, D.C.

MEETINGS AND SYMPOSIA

JUNE

Conjugate Point Symposium, June 13-16, at Boulder, Colo. Sponsor: Air Force Cambridge Research Laboratories. Contact: E. J. Chernosky, (CRFG), Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Mass. 01730, (Area Code 617) 274-6100, Ext. 3713.

Conference on **High Energy Therapy Dosimetry**, June 15-17, at New York, N.Y. Sponsor: Office of Naval Research. Contact: Eunice Thomas Miner, Executive Director, New York Academy of Sciences, 2 E. 63rd St., New York, N.Y. 10021.

Fundamental Physics of the Magnetosphere, June 19-28, at Boston, Mass. Co-sponsors: Air Force Cambridge Research Laboratories and Boston College. Contact: Dr. J. F. McClay, (CRFG), Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Mass. 01731, (Area Code 617), 274-6100, Ext. 3214.

Value Engineering Symposium, June 20, at the Boettcher Auditorium, University of Denver, Denver, Colo. Co-sponsors: Defense Contract Administration Services Office, Denver; and the Defense Contract Services Region, St. Louis. Contact: Maj. H. J. Bukowski, DCASO Denver, 3800 York St., Denver, Colo. 80205, (Area Code 303) 825-1161, Ext. 207.

Computerized Imaging Techniques Seminar, June 26-27, at the Marriott Twin Bridges Motor Hotel, Washington, D.C. Sponsor: Air Force Office of Aerospace Research. Contact: Jerome I. Mantell, Chairman, 18100 Frederick Pike, Gaithersburg, Md. 20760, (Area Code 301) 921-7896.

Field Emission Symposium, June 26-30, at Georgetown University, Washington, D.C. Sponsors: Office of Naval Research, Georgetown University and the National Bureau of Standards. Contact: Lt. Ronald Troutman, Office of Naval Research, Code 427, Room 4102, Main Navy Building, Washington, D.C. 20360, (Area Code 202) OXford 6-2298 or 6-4301.

JULY

1967 Annual Conference on **Nuclear and Space Radiation Effect**, July 10-14, at Ohio State University, Columbus, Ohio. Sponsors: Institute of Electrical and Electronics Engineers, NASA Office of Advanced Research and Technology, Office of Naval Research and the Department of the Army. Contact: Mr. E. E. Conrad, Harry Diamond Laboratories, Washington, D.C. 20438, (Area Code 202) OXford 6-9126.

1967 Summer Seminar on **Mathematics of the Decision Sciences** at Stanford University, Palo Alto, Calif., July 10-Aug. 11. Sponsors: Air Force Office of Scientific Research, Atomic Energy Commission, Army Research Office, Small Business Administration, National Bureau of Standards, Office of Naval Research, National Institutes of Health and the National Science Foundation. Contact: Maj. John Jones Jr., (SRMA), Air Force Office of Scientific Research, 1400 Wilson Blvd. Arlington, Va. 22209, (Area Code 202) OXford 4-5261.

Second International Symposium on **Nucleonics in Aerospace**, July 12-14, at the Sheraton Columbus Hotel, Columbus, Ohio. Sponsors: Air Force Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio; Atomic Energy Commission, and the Instrument Society of America. Contact: Dr. Paul Polishuk, Air Force Flight Dynamics Laboratory, Wright-Patterson AFB, Ohio 45433.

Seminar on **Stratosphere and Mesosphere**, July 24-Aug. 4, at Stanstead, Quebec, Canada. Co-sponsors: Air Force Cambridge Research Laboratories and McGill University. Contact: H. S. Muench, (CRHB), Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Mass. 01730, (Area Code 617) 274-6100, Ext. 2541.

Earth's Particles and Fields Symposium, July 31- Aug. 11, at Freising, Germany. Sponsor: Air Force Cambridge Research Laboratories, Defense Atomic Support Agency, Office of Naval Research and NATO. Contact: L. Katz, (CRFC), Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Mass. 01730. (Area Code 617) 274-6100, Ext. 3177.

AUGUST

12th Annual Technical Symposium, Aug. 7-11, at the International Hotel, Los Angeles, Calif. Co-sponsors: Air Force Systems Command and the Office of Aerospace Research. Contact: Dr. John H. Atkinson, Technical Program, S.P.I.E. Symposium, P.O. Box 288, Redondo Beach, Calif. 90277.

SEPTEMBER

International Symposium on **Information Theory**, Sept. 11-15, at Athens, Greece. Co-sponsors: Air Force Office of Scientific Research and the Institute of Electrical and Electronics Engineers. Contact: Lt. Col. B. R. Agins, (SRMA), Air Force Office of Scientific Research, 1400 Wilson Blvd., Arlington, Va. 22209, (Area Code 202) OXford 4-5261.

International Symposium on **Materials—Key to Effective Use of the Sea**, Sept. 12-14, at the Statler-Hilton Hotel, New York, N.Y. Co-sponsors: Naval Applied Science Laboratory and the Polytechnic Institute of Brooklyn, N.Y. Contact: D. H. Kallas, Associate Technical Director, Naval Applied Science Laboratory, Flushing and Washington Avenues, Brooklyn, N.Y. 11251.

Fourth International Conference on **Atmospheric and Space Electricity**, Sept. 29-Oct. 6, at Lucerne, Switzerland. Sponsors: Air Force Cambridge Research Laboratories, Army, Navy, National Science Foundation and National Aeronautics and Space Administration. Contact: M. B. Gilbert, (CRTE), Air Force Cambridge Research Laboratories, L. G. Hanscom Field, Mass. 01731, (Area Code 617) 274-6100, Ext. 3633.

ABOUT PEOPLE

DEPARTMENT OF DEFENSE

Maj. Gen. Earl C. Hedulund, USAF, (nominated for promotion to the rank of lieutenant general) has been designated by the Secretary of Defense to be Dir. of the Defense Supply Agency (DSA) effective July 1, 1967. He will succeed **Vice Adm. Joseph M. Lyle, USN,** who is retiring. Gen. Hedlund has been Dep. Dir. of DSA since Aug. 1964. The new DSA Dep. Dir. has not yet been named.

Brig. Gen. David I. Liebman, USAF, Military Assistant to Asst. Secretary of Defense (Public Affairs) has been ordered to duty as Dep. Dir. for Plans, J–3, U.S. European Command.

Dr. Gardiner L. Tucker, Dir. of Research, International Business Machines Corp., has been selected to become the Dep. Dir. of Defense Research and Engineering (Electronics and Information Systems) effective July 1. He succeeds Thomas F. Rogers who has been appointed Dir., Office of Urban Technology, Department of Housing and Urban Development.

Mr. Thomas J. O'Brien has been designated as Dep. Dir. for Telecommunications Policy, Office of the Asst. Secretary of Defense (Installations and Logistics).

Capt. E. C. Oldfield, USN, has been named Dep. Commander, Defense Industrial Supply Center, Philadelphia, Pa.

Col. Harley L. Grimm, USAF, has been assigned as Chief, AUTOVON Project Management Office, Defense Communications Agency.

DEPARTMENT OF THE ARMY

Lt. Gen. J. H. Polk has been named Commander-in-Chief, U. S. Army, Europe, effective June 1, in the grade of general, replacing **Gen. Andrew P. O'Meara,** who will retire.

Dr. William L. Everitt, Dean of Engineering at the University of Illinois, has been appointed as a member of the Advisory Group at U.S. Army Weapons Command, Rock Island, Ill.

The following assignments have been announced by the Office of the Chief of Army Engineers: **Brig. Gen. Harry G. Woodbury Jr.,** Dir. of Civil Works; **Brig. Gen. Charles C. Noble,** Dep. Dir. of Civil Works; **Col. Robert L. Bangert,** District Engineer, Portland, Ore.; **Col. Walter C. Gelini,** District Engineer, Rock Island, Ill.; **Col. Richard E. McDonnell,** District Engineer, Seattle, Wash.; **Col. Robert E. Snetzer,** District Engineer, Mobile, Ala.; **Col. James T. White Jr.,** District Engineer, Detroit, Mich.; **Lt. Col. Wayne S. Nichols,** District Engineer, Pittsburgh, Pa.

Lt. Col. John W. Elliott has relieved **Col. Karl H. Zornig** as Commanding Officer of the Army Aviation Test Activity, Edwards AFB, Calif. Col. Zornig was transferred to the Army Materiel Command in Washington, D.C.

DEPARTMENT OF THE NAVY

RAdm. John P. Sager has been named the Vice Commander, Naval Air Systems Command. He previously served as Asst. Commander for Material Acquisition of the Air Systems Command.

RAdm. Roy S. Benson has relieved **RAdm. Means Johnston Jr.** as Commandant of the First Naval District headquartered at Boston, Mass.

RAdm. Alexander S. Goodfellow Jr. has been reassigned as Dep. Chief of Naval Material (Development).

RAdm. Thomas J. Walker III has been assigned as Dep. Commander for Plans and Programs and Comptroller, Naval Air Systems Command.

RAdm. Marshall E. Dornin has been named Commandant of the Eleventh Naval District headquartered at San Diego, Calif.

RAdm. Emmett P. Bonner has been assigned as Commander, Mines, Atlantic Fleet.

The following captain assignments have been announced by the Chief of Naval Personnel:

Capt. Edward G. Underhill, Commanding Officer, North Eastern Div., Naval Facilities Engineering Command; **Capt. Karl S. Vanmeter,** Naval Air Systems Command Representative, Wright-Patterson AFB, Ohio; **Capt. Kenan C. Childers Jr.,** Asst. Commander for Material Acquisition, Naval Air Systems Command; **Capt. Perry M. Boothe,** Dep. Commander, South Western Div., Naval Facilities Engineering Command; **Capt. Robert J. Ney,** Dep. Commander, Navy Missile Center, Point Mugu, Calif.

DEPARTMENT OF THE AIR FORCE

Maj. Gen. Charles H. Terhune Jr. has been designated Vice Commander, Air Force Systems Command. He replaces **Lt. Gen. Waymond A. Davis** who retired on April 30.

Brig. Gen. Jack Bollerud has been assigned as Dep. Chief of Staff (Bioastronautics and Medicine) at Air Force Systems Command headquarters.

Brig. Gen. Joseph N. Donovan has been assigned as Commander, Tactical Airlift Center, Pope AFB, N.C.

Brig. Gen. Clifford J. Kronauer Jr., has been appointed Commander, Air Force Western Test Range, Vandenberg AFB, Calif.

Mr. Robert E. Johnson has been designated Dep. for Programs Analysis in the Office of the Dep. Under Secretary of the Air Force (Manpower).

Col. Rupert P. Collins is the new Dep. Commander, Military Aircraft Storage and Disposal Center, Davis-Monthan AFB, Ariz.

Col. Howard H. Wittrock has been reassigned as Dir., (Plans and Requirements), National Range Div., Air Force Systems Command.

Systems Engineering Group Reassigned within AFSC

The Air Force Systems Command reassigned the Systems Engineering Group (SEG), located at Wright-Patterson AFB, Ohio, from the Research and Technology Division (RTD) to the Aeronautical Systems Division (ASD) effective April 23. No change in location is involved.

Mission responsibility of ASD and SEG will not change, since the primary mission of SEG has been, and is, to provide engineering and technical support to ASD. This internal realignment, therefore, brings the organizational structure more in line with the operational functions of the two organizations.

SEG will continue to be commanded by Brigadier General Gustav E. Lundquist.

(*Continued from page 3*)

TPPC is feasible and that the concept should be applied to appropriate item and system procurements. Several benefits from TPPC are already apparent in LOHAP. These include:

- Development and acquisition of the item in an intensely competitive environment that produced price as well as technical advantages. In addition to competing reliability, quality, maintainability, etc., a dramatic reduction in size and weight is anticipated. In this latter area alone, the contractor is confident of bettering the target weight of 48 pounds. Compared to about 105 pounds for the current avionics complement that LOHAP replaces, this is a technical achievement of considerable magnitude. This reduction, with its concomitant decrease in size, will, in turn, have a most beneficial impact on cockpit instrumentation, cost per flight hour, increased operating range, etc.

- Increased emphasis on design discipline and configuration management to preclude the dissipation of other benefits by excessive engineering changes.

- Careful, continuing evaluation by the contractor to select the most efficient means of obtaining supplies and services.

- Maximum motivation to the contractor to design for the economical production of equipment that will fill the intended need.

From the standpoint of lessons learned, it also is apparent that greater definition of the logistics and support effort would have enhanced the total package application to LOHAP. These lessons are now being applied to two current ECOM procurements for an airborne radio set, AN/ARC–98, and a tactical fire direction system, TACFIRE. These procurements reflect the LOHAP experience plus the escalation and change-inhibiting features of the C–5A procurement.

As previously noted, extended study of TPPC applications will be required to establish the efficacy of the concept. For this purpose, the Department of the Army has directed periodic review and report on the LOHAP and AN/ARC–98 procurements.

Army Tests New Amphibious Lighters

The Army is evaluating a new series of amphibious lighters—designated LARC V, LARC XV and LARC LX—which will be capable of loading or discharging vessels lying offshore, receiving or delivering cargo at shipside, and transporting cargo over the beach to or from inland supply areas.

LARC LX, reputedly the largest amphibian of its type in the world, is constructed of welded steel and powered by four diesel engines. The huge lighter accommodates a crew of four. Designed to handle a 60-ton payload, it can transport approximately 100 tons in an emergency.

With a 15-ton payload aboard, the LARC XV, constructed of welded aluminum and powered by two diesel engines, can travel 25 miles an hour on a smooth hard surface. The four-wheel, all-wheel drive vehicle makes about 10 miles an hour in the water with the same load.

Evaluation of the new amphibious lighters is being performed at Fort Story, Va., under an accelerated test program established by the U.S. Army Test and Evaluation Command, Aberdeen Proving Ground, Md.

USAF To Build 841 Family Housing Units

The Air Force has been authorized to proceed with construction of 841 family housing units at seven U.S. bases. Funds released for this purpose total $14,233,453.

The 841 units are part of a total of 8,250 family housing units authorized in the Military Construction Act for FY 1966. Awarding of contracts was temporarily deferred in December 1965.

Major Air Force commands involved in the construction began advertising for bids following receipt of authority March 7.

Construction will be performed at the following Air Force installations:

Cannon AFB, N.M.	150 units
Eglin AFB, Fla.	300 units
Ent AFB, Colo.	40 units
Keesler AFB, Miss.	100 units
Langley AFB, Va.	100 units
Nellis AFB, Nev.	1 unit
Scott AFB, Ill.	150 units

Enlisted technicians of the Army General Equipment Test Activity examine the wheel assembly of the LARC LX, the world's largest amphibious vehicle.

Report on Status of Funds

Sheldon W. Taylor
Dir. for Financial Analysis and Control
Office, Asst. Secretary of Defense (Comptroller)

Appearing in the *Defense Industry Bulletin* for the first time is a reprint (beginning on page 22) of the Report on Status of Funds by Functional Title published by the Office of the Assistant Secretary of Defense (Comptroller). This report shows the monthly progress in obligation of DOD programs and in resultant expenditures. The report covers all military function programs, as well as the Military Assistance Program for which DOD is executive agent.

The report is presented basically in two sections—the first section deals with expenditures (payments) and unpaid obligations (requiring future payment), and the second section with obligational availability, obligations incurred, and unobligated balances. Each section includes DOD-wide summaries for both military functions and a breakout for each of the Military Departments, the Office of the Secretary of Defense/Defense Agencies, and the Office of Civil Defense.

The source data for the report originate in the Military Departments, the Defense Agencies, and the above-mentioned offices. However, the data maintained by these components are not uniform or comparable in every respect. It was this lack of comparability which prompted initiation of the Status of Funds Report shortly after creation of the Defense Department. Officials of DOD had need of comparable figures in order to be able to make meaningful comparisons and to obtain DOD-wide summaries of expenditure and obligation data. The Status of Funds Report was created to meet this need. Since that time the accounting structures of the various DOD components have become more uniform, and it is only in a few areas that the components are required to convert data to the specified uniform classification.

It should be noted that in the section covering obligation transactions, amounts are inclusive of reimburseable work performed by the respective DOD components for each other and for non-DOD agencies. To the extent that the reimburseable orders originate in DOD, an unavoidable duplication occurs in the amounts of obligational availability and in the obligations incurred. An examination is now under way to determine the feasibility of also converting these obligation figures to a net basis.

While initially intended to be used primarily for intra-governmental purposes, the report has been distributed upon request to defense contractors, banks, other businesses, and private economic forecasters on an ever widening basis. Contractors are particularly interested in the data on obligational availability and obligations incurred, since these give a good indication of recent and anticipated contract award activity. Economists, interested in the impact of defense purchases on the economy, examine both obligation and expenditure data since the timing of contractor acquisition of additional labor and material resources typically falls somewhere between the signing of a contract and the incurrence of expenditures by the Government.

Requests for this sort of information have increased to the point that it is difficult to handle queries on an individual basis. In addition, the economic impact of increased defense spending incident to the Vietnam conflict has further heightened interest. The combination of these factors have resulted in a decision to further increase distribution of the report by incorporating it periodically in the *Defense Industry Bulletin.*

The current issue presents data for the first and second quarters of FY 1967. Future issues of the *Bulletin* will present data for subsequent quarters of the fiscal year at quarterly intervals.

All questions concerning the Report on Status of Funds by Functional Title should be directed to:

Directorate for Financial
Analysis and Control
Office of Assistant Secretary of
Defense (Comptroller)
Room 3C 839
The Pentagon
Washington, D.C. 20301

Report on
Status of Funds
By Functional Title
Department of Defense Military Functions and Military Assistance Program
Expenditures Fiscal Year 1967

(Amounts in Thousands)

Department of Defense

	Expenditures							Unpaid Obligations	
	July 1966	Aug. 1966	Sept. 1966	Oct. 1966	Nov. 1966	Dec. 1966	Cum. thru Dec. 1966	At Start of Year	As of Dec. 31, 1966
Military Personnel									
Active forces	1,077,647	1,344,158	1,426,440	1,421,998	1,338,004	1,471,760	8,080,007	589,609	1,088,356
Reserve forces	96,285	95,866	72,296	73,528	57,648	68,912	464,535	156,797	128,291
Retired pay	140,726	143,946	145,134	146,813	148,087	154,730	879,436	8,052	8,857
Undistributed	80,994	–42,438	–38,878	–1,116	8,971	–87,950	–80,417	–	80,417
Total—Military Personnel	1,395,653	1,541,531	1,604,992	1,641,224	1,552,710	1,607,452	9,343,562	754,459	1,305,920
Operation and Maintenance	1,079,188	1,481,966	1,864,236	1,439,691	1,444,369	1,401,373	8,710,823	3,022,637	3,718,101
Procurement									
Aircraft	844,553	610,597	680,459	568,595	535,922	627,579	3,867,705	7,508,668	8,085,518
Missiles	90,260	152,319	178,566	117,329	179,274	238,074	955,822	2,083,027	1,853,630
Ships	93,975	127,246	114,599	58,497	99,792	154,827	648,936	2,867,571	3,198,708
Tracked combat vehicles	11,929	1,230	9,880	20,799	18,943	20,267	83,048	449,010	563,779
Ordnance, vehicles, & related equip.	168,994	212,458	237,520	288,066	264,774	345,386	1,517,198	6,110,216	6,755,155
Electronics and communications	64,595	102,063	91,395	81,970	135,795	107,975	583,793	1,855,134	1,716,380
Other procurement	181,638	93,605	104,734	96,883	114,052	120,842	711,754	1,582,769	1,626,398
Undistributed	103,882	67,612	47,936	60,893	–5,120	12,658	287,861	–337,631	–626,831
Total—Procurement	1,559,826	1,367,128	1,465,094	1,293,027	1,343,437	1,627,603	8,656,115	22,118,764	23,172,736
Research, Development, Test, & Evaluation									
Military sciences	64,401	103,146	99,903	74,290	82,974	79,697	504,411	891,487	822,310
Aircraft	71,001	83,637	96,043	99,359	87,001	102,112	539,153	539,278	665,219
Missiles	117,625	186,861	199,550	206,729	189,729	229,929	1,130,423	1,097,218	1,471,891
Astronautics	80,905	91,049	102,205	76,739	45,389	116,689	512,976	599,546	501,133
Ships	29,914	31,088	27,025	26,519	23,696	24,543	162,785	204,792	209,820
Ordnance, vehicles, & related equip.	20,391	25,656	36,639	23,191	28,025	31,103	165,005	237,072	292,765
Other equipment	35,763	46,956	63,653	46,854	53,790	54,315	301,331	480,164	536,177
Program-wide management & support	38,078	41,213	39,969	40,834	28,154	33,216	221,464	154,656	164,753
Undistributed	76,114	59,594	26,013	–24,665	24,812	–31,155	130,713	–145,833	–277,012
Total—Research, Development, Test, & Evaluation	534,192	669,202	691,001	569,846	563,569	640,452	3,668,262	4,058,380	4,387,055
Military Construction	128,188	160,507	121,286	196,533	139,684	126,858	873,056	1,309,722	1,134,072
Family Housing	40,127	48,181	49,111	49,423	50,737	38,030	275,609	130,266	116,712
Civil Defense	4,827	8,141	10,686	6,181	7,417	11,317	48,569	77,877	81,747
Other—Special Foreign Currency Program	–	–	–	–	–	–	–	–	–
Revolving and Management Funds[a]	–81,277	75,876	–80,972	89,175	160,253	241,725	404,780	658,208	–261,348
Subtotal—Military Functions	4,660,723	5,352,531	5,725,435	5,285,100	5,262,177	5,694,810	31,980,776	32,130,313	33,654,994
Military Assistance	6,370	51,386	47,134	61,358	76,867	62,638	305,753	1,816,161	2,168,773
TOTAL—DEPARTMENT OF DEFENSE	4,667,093	5,403,917	5,772,569	5,346,458	5,339,044	5,757,448	32,286,529	33,946,474	35,823,767

[a] Includes In-Transit Stock Fund charges not reflected in Service amounts below.
NOTE: Amounts will not necessarily add to totals due to rounding.

Department of the Army

	Expenditures							Unpaid Obligations	
	July 1966	Aug. 1966	Sept. 1966	Oct. 1966	Nov. 1966	Dec. 1966	Cum. thru Dec. 1966	At Start of Year	As of Dec. 31, 1966
Military Personnel									
Active forces	286,518	482,996	563,240	569,891	529,900	612,436	3,044,981	320,524	532,299
Reserve forces	60,349	67,827	51,269	46,382	39,146	48,098	313,071	114,434	87,473
Undistributed	79,429	–34,811	–69,089	–4,481	15,139	–69,658	–83,471	–	83,471
Total—Military Personnel	426,296	516,012	545,420	611,792	584,185	590,876	3,274,581	434,958	703,245
Operation and Maintenance	402,415	440,747	883,202	543,001	504,745	419,559	3,193,669	881,122	1,176,414
Procurement									
Aircraft	63,477	70,021	64,775	67,072	78,517	91,026	434,888	1,137,653	1,182,822
Missiles	14,982	15,635	18,171	24,972	30,029	21,944	125,733	537,097	453,789
Tracked combat vehicles	11,912	1,149	9,695	20,560	18,560	20,161	82,037	432,565	544,288
Ordnance, vehicles, and related equipment	71,653	116,867	126,937	173,044	134,503	134,341	757,345	3,421,137	3,439,979
Electronics and communications	3,850	29,826	29,641	26,603	68,354	27,550	185,824	738,404	698,998
Other procurement	24,786	41,225	38,687	57,120	42,579	48,037	252,434	666,038	637,188
Undistributed	102,141	68,167	45,124	38,566	–7,544	20,926	267,380	–337,631	–606,350
Total—Procurement	292,801	342,890	333,028	407,939	364,998	363,984	2,105,640	6,595,263	6,350,712
Research, Development, Test, and Evaluation									
Military sciences	9,408	13,734	13,092	13,707	11,505	13,896	75,342	120,589	148,550
Aircraft	7,728	8,820	10,966	8,478	9,344	11,889	57,225	92,925	91,132
Missiles	24,527	65,788	49,504	68,994	50,231	82,573	341,617	461,337	588,563
Astronautics	2,675	2,987	1,570	1,453	1,843	1,662	12,190	20,741	15,289
Ordnance, vehicles, and related equipment	10,328	9,954	12,011	12,364	16,797	18,316	79,770	139,922	182,220
Other equipment	14,165	16,751	21,620	17,931	24,645	18,157	113,269	197,438	205,246
Program-wide management and support	5,506	10,360	4,341	8,840	5,439	7,442	41,928	31,310	39,684
Undistributed	68,086	46,294	38,478	–8,659	7,867	–19,909	132,157	–145,833	–278,456
Total—Research, Development, Test, and Evaluation	142,422	174,689	151,582	123,107	127,672	134,025	853,497	918,429	992,228
Military Construction	2,675	7,126	9,487	36,317	32,584	37,923	126,112	518,995	682,702
Revolving and Management Funds	–135,657	–138,807	–217,768	–90,569	114,934	181,190	–286,677	40,077	–147,171
TOTAL—DEPARTMENT OF THE ARMY	1,130,953	1,342,655	1,704,952	1,631,589	1,729,117	1,727,556	9,266,822	9,388,844	9,758,127

Department of the Navy

	Expenditures							Unpaid Obligations	
	July 1966	Aug. 1966	Sept. 1966	Oct. 1966	Nov. 1966	Dec. 1966	Cum. thru Dec. 1966	At Start of Year	As of Dec. 31, 1966
Military Personnel									
Active forces	376,835	405,217	439,382	412,828	369,631	402,486	2,406,379	141,289	309,914
Reserve forces	15,153	14,725	11,826	11,727	11,363	10,856	75,650	20,898	19,565
Undistributed	1,630	–7,680	8,069	4,133	–3,965	1,197	3,384	–	–3,384
Total—Military Personnel	393,618	412,262	459,277	428,688	377,029	414,539	2,485,413	162,187	326,095
Operation and Maintenance	277,917	585,863	353,975	384,619	400,711	431,206	2,434,291	1,230,060	1,221,460
Procurement									
Aircraft	185,066	201,461	206,146	204,670	222,168	256,026	1,275,537	2,818,833	2,669,126
Missiles	40,178	38,531	40,079	10,710	38,098	58,169	225,765	560,035	467,427
Ships	93,975	127,246	114,599	58,497	99,792	154,827	648,936	2,867,571	3,198,708
Tracked combat vehicles	17	81	185	239	383	106	1,011	16,445	19,491
Ordnance, vehicles, and related equipment	43,109	56,452	59,637	71,298	66,131	120,677	417,304	1,418,223	1,495,632
Electronics and communications	25,687	32,897	29,561	30,072	27,543	38,353	184,113	589,237	540,156
Other procurement	40,832	43,819	36,999	25,940	50,498	45,671	243,759	726,357	778,525
Undistributed	52	–5,339	10,243	13,812	4,327	–1,000	22,095	–	–22,095
Total—Procurement	428,915	495,147	497,453	415,235	508,941	672,827	3,018,518	8,996,701	9,146,971
Research, Development, Test, and Evaluation									
Military sciences	13,729	19,157	40,524	11,938	10,748	15,182	111,278	137,459	117,168
Aircraft	12,911	21,008	22,251	29,776	18,134	5,173	109,253	159,020	144,589
Missiles	42,959	53,818	58,752	53,129	65,930	61,355	335,943	249,864	391,086
Astronautics	1,280	2,135	2,487	2,552	1,551	2,366	12,371	15,876	12,869
Ships	29,914	31,088	27,025	26,519	23,696	24,543	162,785	204,792	209,820
Ordnance, vehicles, and related equipment	10,063	15,702	24,628	10,827	11,228	12,787	85,235	97,150	110,545
Other equipment	4,779	7,051	7,840	5,935	4,631	7,006	37,242	61,511	63,025
Program-wide management and support	9,596	10,434	10,383	11,927	3,132	3,963	49,435	88,594	87,663
Undistributed	5,733	1,120	3,785	–21,232	2,458	12,434	4,298	–	–4,298
Total—Research, Development, Test, & Evaluation	130,964	161,513	197,675	131,371	141,508	144,809	907,840	1,014,266	1,132,467
Military Construction	105,735	137,563	103,084	87,829	52,747	38,840	525,798	323,771	50,407
Revolving and Management Funds	–76,072	–251,506	86,350	120,712	44,827	–53,018	–128,707	617,445	557,877
TOTAL—DEPARTMENT OF THE NAVY	1,261,078	1,540,841	1,697,814	1,568,455	1,525,763	1,649,203	9,243,154	12,344,431	12,435,277

Department of the Air Force

	Expenditures							Unpaid Obligations	
	July 1966	Aug. 1966	Sept. 1966	Oct. 1966	Nov. 1966	Dec. 1966	Cum. thru Dec. 1966	At Start of Year	As of Dec. 31, 1966
Military Personnel									
Active forces	414,294	455,945	423,818	439,279	438,473	456,838	2,628,647	127,796	246,143
Reserve forces	20,783	13,314	9,201	15,419	7,139	9,958	75,814	21,465	21,253
Undistributed	–65	53	22,142	–768	–2,203	–19,489	–330	–	330
Total—Military Personnel	435,012	469,312	455,161	453,930	443,409	447,307	2,704,131	149,261	267,726
Operation and Maintenance	326,870	378,501	535,068	451,463	466,719	474,808	2,633,429	805,314	1,204,194
Procurement									
Aircraft	596,010	339,115	409,538	296,853	235,237	280,527	2,157,280	3,552,182	4,233,570
Missiles	35,100	98,153	120,316	81,647	111,147	157,961	604,324	985,895	932,414
Ordnance, vehicles and related equipment	54,232	38,813	50,847	43,581	63,937	90,047	341,457	1,269,060	1,817,995
Electronics and communications	34,466	38,728	30,507	24,780	39,452	41,114	209,047	519,055	470,732
Other procurement	114,544	7,452	27,809	12,397	19,709	21,391	203,302	153,725	168,974
Undistributed	1,793	4,576	–7,445	8,390	–2,331	–6,759	–1,776	–	1,776
Total—Procurement	836,145	526,837	631,573	467,646	467,154	584,279	3,513,634	6,479,917	7,625,461
Research, Development, Test, and Evaluation									
Military sciences	12,026	14,421	10,983	10,465	11,395	13,918	73,208	131,634	122,611
Aircraft	50,362	53,809	62,826	61,105	59,523	85,050	372,675	287,333	429,498
Missiles	50,139	67,255	91,294	84,606	73,568	86,001	452,863	386,017	492,242
Astronautics	76,950	85,927	98,148	72,734	41,995	112,661	488,415	562,929	472,975
Other equipment	16,819	23,154	34,193	22,988	24,514	29,152	150,820	221,215	267,906
Program-wide management and support	22,976	20,419	25,245	20,067	19,583	21,811	130,101	34,752	37,406
Undistributed	2,294	12,181	–16,250	5,226	14,487	–23,680	–5,742	–	5,742
Total—Research, Development, Test, & Evaluation	231,567	277,166	306,441	277,188	245,063	324,916	1,662,341	1,623,880	1,828,380
Military Construction	16,293	17,428	6,072	71,643	53,223	49,012	213,671	442,931	381,908
Revolving and Management Funds	–64,285	29,871	–2,443	6,971	–6,463	–52,053	–88,402	686	–4,493
TOTAL—DEPARTMENT OF THE AIR FORCE	1,781,602	1,699,115	1,931,873	1,728,840	1,669,104	1,828,270	10,638,804	9,501,989	11,303,176

Defense Agencies/Office of the Secretary of Defense

	Expenditures							Unpaid Obligations	
	July 1966	Aug. 1966	Sept. 1966	Oct. 1966	Nov. 1966	Dec. 1966	Cum. thru Dec. 1966	At Start of Year	As of Dec. 31, 1966
Military Personnel									
Retired Pay	140,726	143,946	145,134	146,813	148,087	154,730	879,436	8,052	8,857
Operation and Maintenance	71,985	76,856	91,991	60,607	72,196	75,800	449,435	106,140	116,032
Procurement									
Ordnance, vehicles, and related equipment	–	326	99	143	203	321	1,092	1,796	1,549
Electronics and communications	592	612	1,686	515	446	958	4,809	8,438	6,494
Other procurement	1,476	1,109	1,239	1,426	1,266	5,743	12,259	36,649	41,711
Undistributed	–104	208	14	125	428	–509	162	–	–162
Total—Procurement	1,964	2,255	3,039	2,208	2,344	6,512	18,322	46,883	49,592
Research, Development, Test, and Evaluation									
Military sciences	29,238	55,834	35,304	38,180	49,326	36,701	244,583	501,805	433,981
Military Construction	3,485	–1,611	2,644	743	1,131	1,084	7,476	24,025	19,054
Family Housing	40,127	48,181	49,111	49,423	50,737	38,030	275,609	130,266	116,712
Other—Special Foreign Currency Program	–	–	–	–	–	–	–	–	–
Revolving and Management Funds	–11,141	41,146	28,309	58,033	53,942	76,102	246,391	–	–5,385
TOTAL—DEFENSE AGENCIES/OSD	276,385	366,606	355,532	356,007	377,762	388,960	2,121,252	817,172	738,841
Office of Civil Defense									
Civil Defense	4,827	8,141	10,686	6,181	7,417	11,317	48,569	77,877	81,747
Revolving and Management Funds	*	*	–1	–	–	–	–1	–	–
TOTAL—OFFICE OF CIVIL DEFENSE	4,827	8,141	10,685	6,181	7,417	11,317	48,568	77,877	81,747
Military Assistance									
Military Personnel	–	–	–		–	5	5	72	53
Operation and Maintenance	9,262	27,418	29,706	22,107	30,628	17,067	136,188	364,523	31,165
Procurement									
Aircraft	296	35,012	3,970	10,152	12,274	33,415	95,119	339,429	286,630
Missiles	80	1,250	965	5,673	1,829	1,807	11,604	67,918	58,586
Ships	–	537	1,336	113	643	434	3,063	114,172	126,330
Ordnance, vehicles, and related equipment	56	3,771	9,381	7,736	11,168	7,005	39,117	248,867	268,283
Electronics and communications	1,150	8,850	1,604	4,471	3,235	3,479	22,789	181,174	171,099
Other procurement	–2,037	4,226	48	5,585	5,415	4,331	17,568	138,193	141,818
Total—Procurement	–455	53,645	17,306	33,728	34,565	50,473	189,262	1,089,753	1,052,744
Research, Development, Test, and Evaluation	–	–	–	73	–	24	97	3,084	2,064
Military Construction	913	1,150	5,071	1,434	4,885	709	14,162	151,977	139,824
Revolving Fund	–3,190	405	619	464	8,400	–5,507	1,251	158,605	635,168
Undistributed	–158	31,232	–5,568	3,552	–1,671	–133	–35,210	48,148	307,756
TOTAL—MILITARY ASSISTANCE	6,370	51,386	47,134	61,358	76,867	62,638	305,753	1,816,161 [a]	2,168,773

[a] Consistent with the decision to treat reservations under limitation .002 as obligations in reports commencing with FY 1967, the unpaid obligations at start of year are comprised of obligations/reservations and, thus, differ from the unpaid obligations shown in the report for June 30, 1966.

* Less than $500.

Obligations
Fiscal Year 1967
(Amounts in Thousands)
Department of Defense

	Available for Obligation	Obligations							Unobligated Balance Dec. 31, 1966
		July 1966	Aug. 1966	Sept. 1966	Oct. 1966	Nov. 1966	Dec. 1966	Cum. thru Dec. 31, 1966	
Military Personnel									
Active forces	16,207,095	1,438,480	1,464,093	1,404,108	1,492,694	1,392,227	1,457,216	8,648,818	7,558,277
Reserve forces	937,814	130,578	85,012	55,123	60,247	58,673	55,221	444,854	492,960
Retired pay	1,780,000	140,788	143,613	145,199	147,225	148,433	155,055	880,313	899,687
Total—Military Personnel	18,924,909	1,709,846	1,692,717	1,604,431	1,700,166	1,599,332	1,667,493	9,973,985	8,950,924
Operation and Maintenance	17,773,319	1,769,836	1,928,838	1,720,384	1,561,965	1,636,542	1,536,872	10,154,437	7,618,882
Procurement									
Aircraft	11,589,559	624,342	960,726	1,049,998	755,962	635,642	712,520	4,739,190	6,850,369
Missiles	2,789,910	74,288	188,223	156,795	114,815	173,528	141,324	848,973	1,940,937
Ships	5,157,638	303,994	248,862	60,015	102,568	77,428	240,172	1,033,039	4,124,599
Tracked combat vehicles	564,176	26,360	3,122	76,964	41,900	39,810	27,424	215,580	348,596
Ordnance, vehicles & related equip.	6,457,112	95,653	604,066	368,983	549,460	376,234	512,579	2,506,975	3,950,137
Electronics and communications	1,899,650	43,744	58,445	67,990	89,121	98,534	137,846	495,680	1,403,970
Other procurement	2,072,262	128,888	162,266	64,006	160,950	118,881	169,130	804,121	1,268,141
Undistributed	–395,241	–	–1	+1	–	–7	7	–	–395,241
Total—Procurement	30,135,063	1,297,272	2,225,709	1,844,746	1,814,779	1,520,054	1,940,995	10,643,555	19,491,507
Research, Development, Test, and Evaluation									
Military sciences	1,263,825	60,621	69,646	98,236	70,217	98,575	70,696	467,991	795,834
Aircraft	1,414,363	179,731	125,935	155,196	66,836	50,249	97,930	675,877	738,486
Missiles	2,427,815	251,177	318,776	519,302	225,283	119,873	107,357	1,541,768	886,047
Astronautics	1,420,036	48,668	107,804	96,693	111,312	29.134	120,130	513,741	906,295
Ships	378,640	32,200	30,944	52,922	18,717	18,883	24,265	177,931	200,709
Ordnance, vehicles & related equip.	428,666	18,827	64,048	77,141	28,987	23,280	26,284	238,567	190,009
Other equipment	876,291	35,914	108,137	95,019	41,795	54,878	41,236	376,979	499,312
Program-wide management and support	693,593	57,935	49,669	64,448	50,840	56,079	40,479	319,450	374,143
Emergency Fund	18,195	–	–	–	–	–	–	–	18,195
Undistributed	175,878	–	–76	76	–6	6	–	–	175,878
Total—Research, Development, Test, & Evaluation	9,097,302	685,074	874,792	1,159,122	613,980	450,958	528,376	4,312,304	4,784,999
Military Construction	2,736,365	112,169	107,635	161,186	114,942	122,134	119,277	737,343	1,999,022
Family Housing	729,130	47,462	42,187	41,777	44,866	41,693	47,711	265,696	463,435
Civil Defense	141,550	5,927	4,342	8,829	8,529	13,620	13,009	54,256	87,294
Other—Special Foreign Currency Program	7,348	–	–	–	–	–	–	–	7,348
Subtotal—Military Functions	79,544,986	5,627,586	6,876,218	6,540,478	5,859,225	5,384,336	5,853,732	36,141,575	43,403,411
Military Assistance	742,867	187,257	20,253	–5,324	45,590	–16,914	82,128	312,990	429,877
TOTAL—DEPARTMENT OF DEFENSE	80,287,853	5,814,843	6,896,472	6,535,154	5,904,814	5,367,422	5,935,860	36,454,565	43,833,288

Department of the Army

	Available for Obligation	Obligations							Unobligated Balance Dec. 31, 1966
		July 1966	Aug. 1966	Sept. 1966	Oct. 1966	Nov. 1966	Dec. 1966	Cum. thru Dec. 31, 1966	
Military Personnel									
Active forces	6,286,703	540,119	542,348	530,112	608,703	515,345	558,691	3,295,318	2,991,385
Reserve forces	636,644	96,350	52,841	34,716	39,629	38,040	32,176	293,752	342,892
Total—Military Personnel	6,923,347	636,469	595,189	564,828	648,332	553,385	590,867	3,589,070	3,334,277
Operation and Maintenance	6,211,174	661,876	665,902	712,267	483,886	564,479	650,360	3,738,770	2,472,404
Procurement									
Aircraft	938,513	–2,064	9,679	85,901	79,426	114,845	196,796	484,583	453,930
Missiles	707,369	4,639	5,487	26,159	12,774	35,269	17,388	101,716	605,653
Tracked combat vehicles	548,386	25,392	2,778	77,060	41,579	39,972	24,742	211,523	336,863
Ordnance, vehicles and related equipment	3,220,907	46,570	59,487	193,026	275,043	217,655	325,247	1,117,028	2,103,879
Electronics and communications	579,493	21,600	18,195	28,216	20,650	40,896	31,146	160,703	418,790
Other procurement	625,536	14,542	20,948	37,767	44,991	32,465	90,162	240,875	384,661
Undistributed	7,562	–	–	–	–	–7	7	–	7,562
Total—Procurement	6,627,766	110,680	116,577	448,124	474,464	481,095	685,486	2,316,426	4,311,340
Research, Development, Test, & Evaluation									
Military sciences	249,444	30,030	16,512	13,842	15,685	28,518	9,155	113,742	135,702
Aircraft	137,858	3,855	24,214	5,916	5,939	8,055	9,138	57,117	80,741
Missiles	768,263	45,409	28,423	295,954	56,532	23,484	24,683	474,485	293,778
Astronautics	19,623	186	1,230	687	1,722	1,140	1,975	6,940	12,683
Ordnance, vehicles and related equipment	240,237	14,082	54,080	26,041	14,063	13,758	17,900	139,924	100,313
Other equipment	372,312	14,693	26,427	31,399	15,525	20,465	20,865	129,374	242,938
Program-wide management and support	96,117	13,445	17,465	6,799	7,292	7,184	5,462	57,647	38,470
Undistributed	3,271	–	–	–	–6	6	–	–	3,271
Total—Research, Development, Test, & Evaluation	1,887,125	121,700	168,351	380,637	116,753	102,610	89,178	979,229	907,896
Military Construction	1,296,885	58,824	49,706	129,748	55,388	52,439	54,685	400,790	896,095
TOTAL—DEPARTMENT OF THE ARMY	22,946,298	1,589,550	1,595,723	2,235,604	1,778,824	1,754,007	2,070,578	11,024,286	11,922,012

Department of the Navy

	Available for Obligation	Obligations							Unobligated Balance Dec. 31, 1966
		July 1966	Aug. 1966	Sept. 1966	Oct. 1966	Nov. 1966	Dec. 1966	Cum. thru Dec. 31, 1966	
Military Personnel									
Active forces	4,876,592	430,571	427,296	429,754	432,430	423,842	448,745	2,592,638	2,283,954
Reserve forces	149,320	17,273	15,608	9,766	11,080	9,665	10,557	73,949	75,371
Total—Military Personnel	5,025,912	447,843	442,905	439,520	443,510	433,508	459,301	2,666,587	2,359,325
Operation and Maintenance	5,029,849	340,885	575,579	359,416	500,987	519,743	382,951	2,679,561	2,350,288
Procurement									
Aircraft	3,556,609	8,143	125,745	306,284	246,184	303,217	155,731	1,145,304	2,411,305
Missiles	521,045	204	45,161	27,797	20,527	27,221	19,218	140,128	380,917
Ships	5,157,638	303,994	248,862	60,015	102,568	77,428	240,172	1,033,039	4,124,599
Tracked combat vehicles	15,790	968	341	–93	321	–162	2,682	4,057	11,733
Ordnance, vehicles and related equipment	1,666,162	9,346	30,773	104,940	128,114	102,124	123,389	498,686	1,167,476
Electronics and communications	688,424	3,591	10,461	18,190	33,025	17,832	54,831	137,930	550,494
Other procurement	1,045,719	5,948	115,533	15,129	82,318	49,747	56,000	324,675	721,044
Undistributed	–693,962	–	–	–	–	–	–	–	–693,962
Total—Procurement	11,957,422	332,194	576,879	532,259	613,056	577,407	652,022	3,283,817	8,673,605
Research, Development, Test, and Evaluation									
Military sciences	224,019	16,203	7,269	30,402	12,098	10,863	22,055	98,890	125,129
Aircraft	375,704	2,709	31,890	23,750	10,705	8,157	17,642	94,853	280,851
Missiles	698,753	108,705	67,235	125,241	116,086	33,161	29,433	479,861	218,892
Astronautics	24,858	373	858	4,954	2,944	161	–11	9,279	15,579
Ships	378,640	32,200	30,944	52,922	18,717	18,883	24,265	177,931	200,709
Ordnance, vehicles, and related equipment	188,429	4,745	9,878	51,190	14,924	9,522	8,384	98,643	89,786
Other equipment	114,183	2,502	10,537	13,940	6,399	2,711	4,813	40,902	73,281
Program-wide management and support	366,763	9,798	20,053	26,029	24,919	26,602	13,955	121,356	245,407
Undistributed	124,355	–	–	–	–	–	–	–	124,355
Total Research, Development, Test, & Evaluation	2,495,704	177,235	178,664	328,428	206,792	110,060	120,536	1,121,715	1,373,989
Military Construction	755,409	33,473	54,502	4,334	5,818	48,747	34,084	180,958	574,451
TOTAL—DEPARTMENT OF THE NAVY	25,264,297	1,331,633	1,828,524	1,663,958	1,770,165	1,689,465	1,648,895	9,932,639	15,331,657

Department of the Air Force

	Available for Obligation	Obligations							Unobligated Balance Dec. 31, 1966
		July 1966	Aug. 1966	Sept. 1966	Oct. 1966	Nov. 1966	Dec. 1966	Cum. thru Dec. 31, 1966	
Military Personnel									
Active forces	5,043,800	467,790	494,449	444,242	451,561	453,040	449,780	2,760,862	2,282,938
Reserve forces	151,850	16,955	16,563	10,641	9,538	10,968	12,488	77,153	74,697
Total—Military Personnel	5,195,650	484,745	511,011	454,884	461,099	464,008	462,268	2,838,015	2,357,635
Operation and Maintenance	5,630,478	685,279	602,361	565,502	495,714	472,097	423,676	3,244,629	2,385,849
Procurement									
Aircraft	7,094,437	618,263	825,302	657,813	430,352	217,580	359,993	3,109,303	3,985,134
Missiles	1,561,496	69,445	137,575	102,839	81,514	111,039	104,717	607,129	954,367
Ships	–	–	–	–	–	–	–	–	–
Ordnance, vehicles and related equipment	1,566,635	39,733	513,829	70,960	146,302	55,900	63,668	890,392	676,243
Electronics and communications	614,838	18,280	29,606	21,542	34,603	38,950	51,201	194,182	420,656
Other Procurement	332,941	108,025	18,406	7,691	28,739	33,535	22,155	218,551	114,390
Undistributed	283,089	–	–	–	–	–	–	–	283,089
Total—Procurement	11,453,435	853,746	1,524,717	860,845	721,512	457,005	601,733	5,019,558	6,433,877
Research, Development, Test, & Evaluation									
Military sciences	209,098	6,099	13,762	15,162	13,492	17,463	12,253	78,231	130,867
Aircraft	900,801	173,167	69,831	125,530	50,192	34,037	71,150	523,907	376,894
Missiles	960,799	97,063	223,118	98,107	52,665	63,228	53,241	587,422	373,377
Astronautics	1,375,555	48,109	105,716	91,052	106,646	27,833	118,166	497,522	878,033
Other equipment	389,796	18,719	71,173	49,680	19,871	31,702	15,558	206,703	183,093
Program-wide management and support	230,713	34,692	12,151	31,620	18,629	22,293	21,062	140,447	90,266
Undistributed	48,252	–	–76	76	–	–	–	–	48,252
Total—Research, Development, Test, & Evaluation	4,115,013	377,851	495,673	411,228	261,492	196,557	291,430	2,034,231	2,080,782
Military Construction	665,617	19,368	3,135	25,314	53,826	20,938	30,509	153,090	512,526
TOTAL—DEPARTMENT OF THE AIR FORCE	27,060,194	2,420,989	3,136,899	2,317,772	1,993,643	1,610,604	1,809,616	13,289,523	13,770,670

Defense Agencies/Office of the Secretary of Defense

	Available for Obligation	Obligations							Unobligated Balance Dec. 31, 1966
		July 1966	Aug. 1966	Sept. 1966	Oct. 1966	Nov. 1966	Dec. 1966	Cum. thru Dec. 31, 1966	
Military Personnel									
Retired Pay	1,780,000	140,788	143,613	145,199	147,225	148,433	155,055	880,313	899,687
Operation and Maintenance	901,818	81,796	84,996	83,200	81,376	80,224	79,884	491,476	410,342
Procurement									
Ordnance, vehicles and related equipment	3,408	4	–23	57	1	555	275	869	2,539
Electronics and communications	16,895	273	183	42	843	856	668	2,865	14,030
Other procurement	68,066	373	7,378	3,420	4,902	3,136	811	20,020	48,046
Undistributed	8,070	–	–	–	–	–	–	–	8,070
Total—Procurement	96,439	650	7,538	3,519	5,746	4,547	1,754	23,754	72,685
Research, Development, Test, and Evaluation									
Military sciences	581,264	8,289	32,103	38,830	28,942	41,731	27,233	177,128	404,136
Emergency Fund	18,195	–	–	–	–	–	–	–	18,195
Undistributed	–	–	–	–	–	–	–	–	
Total—Research, Development, Test, & Evaluation	599,459	8,289	32,103	38,830	28,942	41,731	27,233	177,128	422,332
Military Construction	18,453	504	292	1,790	–90	10	13,443	2,504	15,949
Family Housing	729,130	47,462	42,187	41,777	44,866	41,693	47,711	265,696	463,435
Other—Special Foreign Currency Program	7,348	–	–	–	–	–	–	–	7,348
TOTAL—DEFENSE AGENCIES/OSD	4,132,648	279,488	310,730	314,314	308,065	316,639	311,635	1,840,871	2,291,777
Office of Civil Defense									
Civil Defense	141,550	5,927	4,342	8,829	8,529	13,620	13,009	54,256	87,294
Military Assistance									
Military Personnel	–12	–	–	–12	–	–	–	–12	–
Operation and Maintenance	493,956	106,601	13,125	11,415	15,390	–7,370	19,235	158,396	335,560
Procurement									
Aircraft	42,608	18,366	5,186	–423	18,534	–7,476	8,132	42,319	289
Missiles	2,777	3,433	–1,116	–1,209	549	31	584	2,272	505
Ships	26,141	3,448	831	3,375	109	282	7,175	15,220	10,921
Ordnance, vehicles and related equipment	58,557	32,705	4,326	–9,815	978	–3,007	33,346	59,533	24
Electronics and communications	12,722	8,188	1,877	–4,453	1,746	489	4,865	12,712	10
Other procurement	22,363	7,725	1,133	–4,219	6,349	1,972	8,234	21,194	1,169
Total—Procurement	165,168	73,866	12,236	–16,744	28,265	–7,707	62,336	152,252	12,916
Research, Development, Test, and Evaluation	–	–	–13	–	–3	1	–909	–924	924
Military Construction	85,734	1,188	384	140	1,968	–1,842	75	1,913	83,821
Undistributed	–1,979	5,603	–5,480	–123	–29	–	1,394	1,365	–3,343
TOTAL—MILITARY ASSISTANCE	742,867	187,257	20,253	–5,324	45,590	–16,914	82,128	312,990	429,877

NOTE: Commencing with reports in FY 1967, reservations under limitation .002 of the Military Assistance Program are being treated as obligations.

BIBLIOGRAPHY

DEFENSE PROCUREMENT CIRCULARS

Distribution is made automatically by the U.S. Government Printing Office to subscribers of the Armed Services Procurement Regulation.

Defense Procurement Circular No. 52, March 24, 1967. (1) Military Standard Transportation and Movement Procedures. (2) Material Inspection and Receiving Report Clause. (3) DD ASPR Form 731—Master Contract for Repair and Alterations of Vessels. (4) Equal Employment Opportunity. (5) Standardized Contract Administration Services for the Military Departments. (6a) Price Adjustments in Contracts for Fluid Milk, (6b) "Fluid Milk" Clause. (7) Contract Work Hours Standards Act. (8) Mandatory Use Date for App. I and new DD Forms 250 and 250c. (9) Automatic Data Processing Equipment.

RESEARCH REPORTS

Authorized DOD contractors and grantees may obtain these documents without charge from:

Defense Documentation Center
Cameron Station
Alexandria, Va. 22314

Others may purchase these documents at the price indicated from:

Clearinghouse for Federal and Scientific Information
Department of Commerce
Springfield, Va. 22151

Water-Jet Feasibility Study. FMC Corp., San Jose, Calif., for the Navy, Jan. 1967, 130 p. Order No. AD–645 425. $3.

Effects of Notches and Saltwater Corrosion on the Flexural Fatigue Properties of Steels for Hydrospace Vehicles. Navy Marine Engineering Lab., Annapolis, Md., Oct. 1966, 42 p. Order No. AD–644 147. $3.

Metal Corrosion in Deep-Ocean Environments. Navy Marine Engineering Lab., Annapolis, Md., Jan. 1967, 31 p. Order No. AD–645 481. $3.

Ambient Noise Levels in Selected Shallow Water off Miami, Fla. Defense Research Lab., University of Texas, Austin, Tex., for the Navy, Dec. 1966, 17 p. Order No. AD–646 229. $3.

Surface Evaluation and Definition (Suede) Program. Electro-Optical Systems, Inc., Pasadena, Calif., for the Navy, Dec. 1966, 111 p. Order No. AD–646 828. $3.

Handbook of Selected Pacific Islands. Pacific Missile Range, Point Mugu, Calif., Dec. 1959, 209 p. Order No. AD–646 916. $3.

Windows for External or Internal Hydrostatic Pressure Vessels, Part I—Conical Acrylic Windows Under Short-Term Pressures Application. Naval Civil Engineering Lab., Port Hueneme, Calif., Jan. 1967, 104 p. Order No. AD–646 882. $3.

Preliminary Test on a Shallow Unreinforced Concrete Shell. Naval Civil Engineering Lab., Port Hueneme, Calif., Jan. 1967, 77 p. Order No. AD–646 860. $3.

Monitoring and Control of Sea Water Composition. Aerojet-General Corp., Azusa, Calif., for the Navy, Feb. 1967, 94 p. Order No. AD–647 129. $3.

Sea Water Environment for the MEL Ocean Pressure Laboratory Phase I, Standardization of Seawater. Navy Marine Engineering Lab., Annapolis, Md., Feb. 1967, 91 p. Order No. AD–647 276. $3.

Low Light Level Photography. Army Engineer Geodesy, Intelligence and Mapping Research and Development Agency, Fort Belvoir, Va., Aug. 1966, 53 p. Order No. AD–642 167. $3.

Electrostatic Imaging. Xerox Corp., Rochester, N.Y., for the Office of Naval Research, Dec. 1966, 65 p. Order No. AD–646 037. $3.

Test and Evaluation of Electronic Image Generation and Projection Devices, Vol. III—Evaluation of Projection Screens. Systems Research Lab., Dayton, Ohio, for the Air Force, Dec. 1965, 68 p. Order No. AD–630 659. $3.

Theoretical Studies of Complexed Transition Metal Thermophototropic Systems. Nuclear Research Associates, Long Island City, N.Y., for the Navy, Aug. 1966, 37 p. Order No. AD–645 539. $3.

Development of a Variscale Stereo Point Marking Instrument. Bausch & Lomb, Inc., Rochester, N.Y., for the Army, Aug. 1966, 80 p. Order No. AD–643 722. $3.

Experimental Study of the Deflagration of Gases and Solids. University of Louvain, for the Air Force, Oct. 1966, 48 p. Order No. AD–643 439. $3.

New Flare Formulations for High Altitude Application. Feltman Research Labs, Dover, N.J., for the Army, Oct. 1966, 24 p. Order No. AD–641 957. $3.

Development of Miniature Smoke Signal Package for Inclusion in Survival Kits. Feltman Research Labs, Dover, N.J., for the Army, Oct. 1966, 46 p. Order No. AD–641 895. $3.

Storage Stability of Pyrotechnic Compositions Containing Vinyl Alcohol Acetate Resin. Picatinny Arsenal, Dover, N.J., Nov. 1966, 30 p. Order No. AD–641 893 $3.

Final Report on the Effects of a Jet Fuel Anti-Icing Additive on Fuel Tank Linings. Naval Research Lab., Washington, D.C., Oct. 1966, 18 p. Order No. AD–644 563. $3.

Thermodynamic and Composition Data for Constant-Volume Combustion of Stoichiometric Mixtures of Hydrogen-Oxygen Diluted with Helium or Hydrogen. University of Toronto, for the Air Force, Nov. 1964, 103 p. Order No. AD–455 747. $3.

Subroutines for IBM System/360 to Facilitate Visual Display and Man-Machine Relationships. Naval Weapons Lab., Dahlgren, Va., Aug. 1966, 240 p. Order No. AD–646 895. $3.

Materials Study for Visual Transformation Devices. Moleculon Research Corp., Cambridge, Mass., for the Air Force, July 1966, 79 p. Order No. AD–646 361. $3.

Exploratory Experimental Studies Comparing Online and Offline Programing Performance. Systems Development Corp., Santa Monica, Calif., for the Air Force, Dec. 1966, 36 p. Order No. AD–645 438. $3.

DEFENSE PROCUREMENT

Contracts of $1,000,000 and over awarded during the month of April 1967:

DEFENSE SUPPLY AGENCY

4—**Gulf Oil Corp.**, Houston, Tex. $1,591,765. Fuel oil and gasoline products to be delivered to various installations on the east coast. Defense Fuel Supply Center, Alexandria, Va.

—**Ingersoll Products, Borg-Warner Corp.**, Chicago, Ill. $2,657,574. 811,980 steel helmets. Defense Personnel Support Center, Philadelphia, Pa.

—**General Aniline and Film Corp.**, New York, N.Y. $1,867,380. 85,804 various sized packages of radiographic film. Defense Personnel Support Center.

5—**J. P. Stevens & Co.**, New York, N.Y. $1,-341,517. 1,958,250 linear yards of cotton cloth. Defense Personnel Support Center, Philadelphia, Pa.

—**M-R-S Mfg. Co.**, Flora, Miss. $1,690,378. 25 construction tractors and 25 scrapers. Defense Construction Supply Center, Columbus, Ohio.

—**Humble Oil & Refining Co.**, Houston, Tex. $3,742,200. 900,000 barrels of Arctic diesel fuel oil. Defense Fuel Supply Center, Alexandria, Va.

10—**Riegel Textile Corp.**, New York, N.Y. $8,-879,318. 20,345,000 square yards of cotton sateen cloth. Defense Personnel Support Center, Philadelphia, Pa.

—**J. P. Stevens & Co.**, New York, N.Y. $3,-359,520. 8,000,000 square yards of cotton sateen cloth. Defense Personnel Support Center, Philadelphia, Pa.

11—**Iselin-Jefferson Co.**, New York, N.Y. $2,-322,345. 4,188,822 yards of fireproof cotton oxford cloth. Defense Personnel Support Center, Philadelphia, Pa.

—**Prestex, Inc.**, New York, N.Y. $5,974,257. 10,476,500 yards of fireproof cotton oxford cloth. Defense Personnel Support Center, Philadelphia, Pa.

—**Trenton Textile Engineering & Mfg. Co.**, Trenton, N.J. $1,636,396. 167,740 men's wet weather parkas. Defense Personnel Support Center, Philadelphia, Pa.

—**General Cable Corp.**, New York, N.Y. $1,-148,642. 21,800 reels of telephone cable. Defense Industrial Supply Center, Philadelphia, Pa.

—**Atlantic Richfield Co.**, Philadelphia, Pa. $1,839,279 Fuel oil & gasoline. Defense Fuel Supply Center, Alexandria, Va.

17—**Laura Industries**, Selma, Ala. $1,230,380. 186,840 men's cotton and nylon raincoats. Defense Personnel Support Center, Philadelphia, Pa.

—**Unaka Co.**, Greeneville, Tenn., $1,781,565. 2,711,667 cases on individual combat meals. Defense Personnel Support Center, Philadelphia, Pa.

—**Trenton Textile Engineering & Mfg. Co.**, Trenton, N.J. $1,099,140. 594,880 waterproof clothing bags. Defense Personnel Support Center, Philadelphia, Pa.

18—**Prestex, Inc.**, New York, N.Y. $1,402,730. 691,000 yards of cotton and nylon duck cloth. Defense Personnel Support Center, Philadelphia, Pa.

20—**Kaiser Steel Corp.**, Oakland, Calif. $7,956,-615. 36,150 bundles of steel landing mats. Defense Construction Supply Center, Columbus, Ohio.

—**R.C.A.**, Harrison, N.J. $1,302,500. Electron transmitting tubes. Harrison. Defense Electronic Supply Center, Dayton, Ohio.

24—**S&W Fine Foods**, San Francisco, Calif. $1,-237,119. 2,183,712 lbs. of roasted ground coffee. Defense Personnel Support Center, Philadelphia, Pa.

25—**Allen Overall Co.**, Monroe, N.C. $1,537,346. 173,908 pairs of men's wet weather overalls. Defense Personnel Support Center, Philadelphia, Pa.

27—**American Air Filter Co.**, St. Louis, Mo. $1,629,630. 953 portable electric flood light sets. Defense General Supply Center, Richmond, Va.

28—**Wilson Mfg. Co.**, Wilson, N.C. $3,475,504. 17,994 medium general purpose tents with covers. Defense Personnel Support Center, Philadelphia, Pa.

—**VA. Tent & Awning Co.**, Norfolk, Va. $2,-234,850. 9,510 medium general purpose tents with covers. Defense Personnel Support Center, Philadelphia, Pa.

CONTRACT LEGEND

Contract information is listed in the following sequence: Date—Company—Value—Material or Work to be Performed—Location of Work Performed—Contracting Agency.

ARMY

3—**Computer Sciences Corp.**, Silver Spring, Md. $1,625,325. Formulation of an Automatic Data Processing program, including formal training. Silver Spring. Army Electronics Command, Fort Monmouth, N.J.

4—**L. E. Mason Co.**, Boston, Mass. $1,253,522. Fuzes for 60mm ammunition. Hyde Park, Mass. Ammunition Procurement & Supply Agency, Joliet, Ill.

5—**Dynamics Corp. of America**, Bridgeport, Conn. $1,232,578. Repair parts for 60-cycle generator sets. Bridgeport. Army Mobility Equipment Command, St. Louis, Mo.

—**Bell Aerospace Corp.**, Fort Worth, Tex. $2,248,565. AH–1G helicopters for qualification testing. Fort Worth. Army Aviation Materiel Command, St. Louis, Mo.

6—**Eltra Corp.**, Toledo, Ohio. $1,613,723. Generators for ¼-ton, ¾-ton and 2½-ton trucks. Bay City, Mich. Army Tank Automotive Command, Warren, Mich.

—**General Motors**, Detroit, Mich. $1,914,027. Generators for ¼-ton, ¾-ton and 2½-ton trucks. Anderson, Ind. Army Tank Automotive Command, Warren, Mich.

—**Sornsin Construction Co.**, Fargo, N.D. $1,-090,402. Work on the muscatine Island Levee District and Muscatine-Louisa County Drainage District #13 project. Muscatine, Iowa. Engineer Dist., Rock Island, Ill.

—**Raber-Kief, Inc.**, and **Beck Constructors**, Seattle, Wash. $1,269,287. Maintenance of runways and taxiways at Shemya AFB, Alaska. Engineer Dist., Anchorage, Alaska.

—**R. G. LeTourneau, Inc.**, Longview, Tex. $3,751,320. Metal parts for 750-lb. bombs. Longview. Ammunition Procurement & Supply Agency, Joliet, Ill.

7—**Okaw Industries**, Torrance, Calif. $1,228,-385. Reinforced plastic containers for storage and transport of equipment to the field. Calexico, Calif. Army Aviation Materiel Command, St. Louis, Mo.

—**Bell Aerospace Corp**, Fort Worth, Tex. $3,-017,172. UH–1 helicopter main blade assemblies. $1,268,797. Rotary wing blades. $3,-637,739. Main rotor hubs. $8,275,920. Rotary wing blades. Fort Worth. Army Aviation Materiel Command, St. Louis, Mo.

—**Raytheon Co**,. Lexington, Mass. $3,503,322. Initial production run of self propelled Hawk missile system ground support equipment. Andover, Mass. and Bristol, Tenn. Army Missile Command, Andover, Mass.

—**J. W. Bateson, Inc.**, Dallas, Tex. $8,069,450. Construction of seven enlisted men's barracks complexes at Fort Gordon, Ga. Engineer Dist., Savannah, Ga.

—**Eugene Luhr & Co.**, Columbia, Ill. $3,223,-870. Work on the Arkansas River and Tributaries, Arkansas and Oklahoma Project. Inola, Okla. Engineer Dist., Tulsa, Okla.

—**Penker Construction Co.**, Cincinnati, Ohio. $4,614,213. Work on the Saylorville Dam and Reservoir, Des Moines River, Iowa Project. Polk City, Iowa. Engineer Dist., Rock Island, Ill.

—**Wetmore & Parman, Inc.**, Jackson, Miss. $2,059,627. Construction work on the Waterways Experiment Station, Vicksburg, Miss., Project. Engineer Dist., Vicksburg, Miss.

—**Peter Kiewit Sons' Co.**, Vancouver, Wash. $4,371,626. Work on the Lower Monumental Lock & Dam, Washington Project. Sargent, Wash. Engineer Dist., Seattle, Wash.

—**International Harvester Co.**, Chicago, Ill. $3,658,272. Trucks. Fort Wayne, Ind., San Leandro, Calif., and Woodbridge, N.J. Army Tank Automotive Command, Warren, Mich.

10—**Cadillac Gage Co.**, Warren, Mich. $1,458,-000. Armored cars. Warren. Army Tank Automotive Command, Warren, Mich.

—**Raytheon Co.**, Lexington, Mass. $2,915,702. Selected items of ground support equipment and field maintenance equipment for the Hawk missile system. Andover, Mass. and Waltham, Mass. Army Missile Command, Andover, Mass.

—**Levinson Steel Co.**, Pittsburgh, Pa. $2,415,-000. Plant reactivation for the production of metal parts for 105mm shells. Pittsburgh. Ammunition Procurement & Supply Agency, Joliet, Ill.

11—**Leece Neville Co.**, Cleveland, Ohio. $1,165,-315. Starters for 2½- and 5-ton trucks. Cleveland. Army Tank Automotive Command, Warren, Mich.

—**Eltra Corp.**, Toledo, Ohio. $1,099,116. Starters for 2½- and 5-ton trucks. Bay City, Mich. Army Tank Automotive Command, Warren, Mich.

—**General Motors**, Detroit, Mich. $1,270,634. Starters for 2½- and 5-ton trucks. Anderson, Ind. Army Tank Automotive Command, Warren, Mich.

—**Day & Zimmermann, Inc.**, Philadelphia, Pa. $2,238,120. Loading, assembling and packing miscellaneous fuzes, boosters, primers and detonators. Texarkana, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Atlas Chemical Industries**, Wilmington, Del. $1,041,845. TNT and operations and maintenance activities. Chattanooga, Tenn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Farell Construction Co.**, Memphis, Tenn. $1,518,366. Work on the Cordell Hull Lock and Dam Project. Carthage, Tenn. Engineer Dist., Nashville, Tenn.

—**M. M. Sundt**, Tucson, Ariz. $1,094,000. Construction of a base communications building; a basic flight training facility; a general purpose shop and a vehicle refueling shop at Williams AFB Ariz. Engineer Dist., Los Angeles, Calif.

12—**Union Carbide Corp.**, New York, N.Y. $3,-982,123 and $3,710,472. Dry batteries. Charlotte, N.C. Army Electronics Command, Philadelphia, Pa.

—**Burgess Battery Co.**, Freeport, Ill. $1,566,-248 and $1,172,928. Dry batteries. Freeport. Army Electronics Command, Philadelphia, Pa.

—**Marathon Battery Co.**, Wausau, Wis. $1,-261,872. Dry batteries. Wausau. Army Electronics Command, Philadelphia, Pa.

—**Hughes Tool Co.**, Culver City, Calif. $2,-065,450. Helicopter armament subsystems. Culver City. Army Weapons Command, Redstone Arsenal, Huntsville, Ala.

—**Levinson Steel Co.**, Pittsburgh, Pa. $10,-425,675. Metal parts for 105mm projectiles. Pittsburgh. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Chamberlain Corp.**, Waterloo, Iowa. $2,-476,387. 155mm smoke projectiles. Scranton, Pa. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**International Harvester Corp.**, Melrose Park, Ill. $2,030,000. Scoop type loaders. Libertyville, Ill. Army Mobility Equipment Command, St. Louis, Mo.

13—**Westinghouse Air Brake Co.**, Peoria, Ill. $1,104,629. Motorized road graders. Indianapolis, Ind. Army Mobility Equipment Command, St. Louis, Mo.

—**King Construction Co.** Texarkana, Tex. $1,769,670. Work on the DeQueen Diamond Reservoir, Arkansas Project. DeQueen, Ark. Engineer Dist., Tulsa, Okla.

—**U.S. Steel Corp.**, Baltimore, Md. $1,062,-995. 18 armor plate line items to be used for ammunition testing. Munhall, Pa. Aberdeen Proving Ground, Md.

—**Standard Dredging Corp.**, New Orleans, La. $1,310,132. Work on the Mississippi River and Tributaries Flood Control-Channel Improvement Project. Work will be done on the reach from Loosahatchie to Memphis, Tenn., and at Island 63 near

Clarksville, Miss. Engineer Dist., Memphis, Tenn.

—**Foster Construction Co.**, Balboa, Canal Zone. $1,140,000. Construction of an air freight terminal, chapel annex, air passenger terminal, recreation gym, and NCO Open Mess alterations at Howard AFB, Canal Zone. Engineer Dist., Jacksonville, Fla.

—**K D I Corp.**, Cincinnati, Ohio. $2,077,351. Metal parts for 2.75-inch rocket fuzes. Cincinnati. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Raytheon Co.**, Lexington, Mass. $6,199,148. Advanced production engineering for the improved Hawk missile system. Andover, Mass. Army Missile Command, Andover, Mass.

—**Raytheon Co.**, Lexington, Mass. $1,807,675. Improved Hawk factory testing equipment and gauging. Andover, Mass. Army Missile Command, Andover, Mass.

14—**Kennedy Van Saun Corp.**, Danville, Pa. $1,151,900. Metal parts for PP–T105mm projectiles. Danville. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**American Machine & Foundry Co.**, Brooklyn, N.Y. $9,120,211. Metal parts for 750-lb. bombs. Garden City, N.Y. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**L. T. Industries**, Garland, Tex. $2,406,967. Assemblies for the 750-lb. bomb. Garland. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**R. G. LeTourneau**, Longview, Tex. $2,303,-616. Fin assemblies for the 750-lb. bomb. Longview. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**U.S. Rubber Co.**, New York, N.Y. $14,834,-417. Loading, assembling and packing ammunition components; manufacturing explosives; and Operations & Maintenance Activities. Joliet, Ill. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Thiokol Chemical Corp.**, Bristol, Pa. $12,-210,753. Loading, assembling and packing miscellaneous shells; loading rocket motors; and Operations and Maintenance Activities. Marshall, Tex. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Olin Mathieson Chemical Corp.**, East Alton, Ill. $2,091,508. Grenade fuzes. New Brighton, Minn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Honeywell, Inc.**, Hopkins, Minn. $4,519,-999. Grenade fuzes. New Brighton, Minn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Lear Siegler, Inc.**, Anaheim, Calif. $2,227,-784. Artillery ammunition boosters. Anaheim. Procurement Detachment, New York, N.Y.

—**Emco Porcelain Enamel Co.**, Port Chester, N.Y. $2,020,000. Ammunition boxes. Port Chester. Frankford Arsenal, Philadelphia, Pa.

—**V&N Construction Co.**, Lubbock, Tex. $1,-247,500. Construction of a hospital barracks complex at Fort Hood, Tex. Engineer Dist., Fort Worth, Tex.

—**Loadcraft, Inc.**, Denton, Tex. $1,083,147. Semi-trailer wreckers. Augusta, Kan. Army Tank Automotive Command, Warren, Mich.

—**Bowen-McLaughlin, Inc.**, York, Pa. $16,-772,847. Retrofit of M48A3 and M48A4 tanks. York. Army Weapons Command, Rock Island, Ill.

17—**Chaney & James Construction Co.**, Richardson, Tex. $2,148,000. Construction of a 1,000-man, three storied dormitory at Sheppard AFB, Tex. Engineer Dist., Albuquerque, N.M.

18—**John Wood Co.**, St. Paul, Minn. $2,049,082. Fin assemblies for 750-lb. bombs. St. Paul. Ammunition Procurement & Supply Joliet, Ill.

—**Ford Construction Co.**, Dyersburg, Tenn. $2,088,440. Work on the East Atchafalaya Levee Project. Near Pierre Pass, La. Engineer Dist., New Orleans, La.

—**McGinnes Bros.**, Houston, Tex. $1,065,105. Work on the Texas City, Tex., Hurricane Protection Project. Engineer Dist., Galveston, Tex.

—**Otis Elevator Co.**, Brooklyn, N.Y. $1,704,-259. 75 semi-trailer vans to house teletype relay facilities. Brooklyn. Army Electronics Command, Philadelphia, Pa.

—**Hol-Gar Mfg. Co.**, Primos, Pa. $1,520,031. 400-cycle diesel generators and spare parts. Primos. Engineer Research Laboratory, Fort Belvoir, Va.

—**Beech Aircraft Corp.**, Wichita, Kan. $7,-833,468. U–21A utility aircraft and related data. Wichita. Army Aviation Materiel Command, St. Louis, Mo.

19—**LTV Electro Systems**, Greenville, Tex. $1,-231,410. Work on a classified project. Greenville. Army Security Agency, Arlington, Va.

—**Westinghouse Air Brake Co.**, Peoria, Ill. $3,088,567. 210 diesel road graders. Peoria. Army Mobility Equipment Command, St. Louis, Mo.

—**General Motors**, Indianapolis, Ind. $2,559,-900. Breech mechanism assemblies for 152mm gun/launchers (M81). Indianapolis. Watervliet Arsenal, N.Y.

—**R.C.A.**, Camden, N.J. $1,000,000. Classified electronic equipment. Camden. Army Electronics Command, Fort Monmouth, N.J.

—**Philco Ford Corp.**, Newport Beach, Calif. $1,491,208. Various quantities of Shillelagh spare parts. Newport Beach. Northwest Procurement Agency, Oakland, Calif.

—**Boyd & Goforth**, Charlotte, N.C., $1,299,-074. Construction of post engineer facilities. Fort Bragg, N.C. Engineer Dist., Savannah, Ga.

—**D. R. Allen & Sons**, Fayetteville, N.C. $1,-178,926. Construction of four administration and storage buildings, one equipment shop and one electronic maintenance shop at Fort Bragg, N.C. Engineer Dist., Savannah, Ga.

20—**Thompson Construction Co.**, Albany, N.Y. $1,537,379. Construction of an industrial liquid waste treatment plant at Watervliet Arsenal, N.Y. Engineer Dist., New York, N.Y.

—**General Dynamics**, Rochester, N.Y. $15,-300,000. Reconfiguration of various digital subscriber terminal telephone system equipment (AUTODIN Program). Rochester. Army Electronics Command, Fort Monmouth, N.J.

21—**Vinnell Corp.**, Alhambra, Calif. $3,099,553. Installation and operation of an equipment reconditioning facility in South Vietnam. Army Mobility Equipment Command, St. Louis, Mo.

—**Great Lakes Dredge & Dock Co.**, New York, N.Y. $1,242,342. Work on the Little Neck Bay Project. Little Neck Bay, N.Y. Engineer Dist., New York, N.Y.

—**Baltimore Contractors, Inc.**, Baltimore, Md. $7,096,000. Construction of a medical biological research laboratory building at Fort Deterick, Md. Engineer Dist., Baltimore, Md.

—**Stewart Warner Corp.**, Lebanon, Ind. $2,-897,550. Metal parts for 60mm projectiles. Lebanon. Ammunition Procurement & Supply Agency, Joliet, Ill.

24—**Albion Malleable Co.**, Albion, Mich. $2,-989,800. Projectile body and band assemblies for 81mm explosives. Albion. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**General Dynamics**, Rochester, N.Y. $3,-570,852. Radio sets. Rochester. Army Electronics Command, Philadelphia, Pa.

—**Caterpillar Tractor Co.**, Peoria, Ill. $4,053,-050. Tractors. Peoria. Army Mobility Equipment Command, St. Louis, Mo.

—**Martin Zachry Constructors**, Honolulu, Hawaii. $16,899,915. Construction of a multi-functional array radar building at Kwajalein Atoll. Engineer Dist., Honolulu, Hawaii.

25—**Menominee, Engineering Corp.**, Menominee, Mich. $1,555,390. Bridge components. Menominee. Army Mobility Equipment Command, St. Louis, Mo.

—**Bulova Watch Co.**, Providence, R.I., $2,-806,210. Head assemblies for M525 fuzes. Providence. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**FMC Corp.**, San Jose, Calif. $3,547,892. M113A1 armored personnel carriers. South Charleston, W. Va. Army Tank Automotive Command, Warren, Mich.

26—**Ryan Contracting Co.**, Evansville, Ind. $1,-401,506. Construction of flood protection components. Sturgis, Ky. Engineer Dist., Louisville, Ky.

—**Philco-Ford Corp.**, Newport Beach, Calif. $2,571,450. Repair procedures, test equipment and establishment and operation of a repair facility for the Shillelagh missile at the Army Depot, Anniston, Ala. Army Missile Command, Redstone Arsenal, Huntsville, Ala.

—**Hughes Aircraft**, Culver City, Calif. $1,-740,000. Thermal night sights plus the engineering procurement data package for the TOW missile. Culver City. Research and Development Laboratories, Fort Belvoir, Va.

—**Whittenberg Engineering & Construction Co.**, Louisville, Ky. $11,416,111. Construction of troop housing and supporting facilities at Fort Knox, Ky. Engineer Dist., Louisville, Ky.

—**General Motors**, Indianapolis, Ind. $4,872,-479. Sheridan tank transmissions. Indianapolis. Army Tank Automotive Command, Warren, Mich.

—**Poloron Products**, New Rochelle, N.Y. $1,-533,129. Fin assemblies for the 750-lb. bomb. Scranton, Pa. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Magnovox Co.**, Fort Wayne, Ind. $5,160,-671. Radio sets. Fort Wayne. Army Electronics Command, Philadelphia, Pa.

27—**Northrop Corp.**, Newbury Park, Calif. $2,-354,400. Target guided missiles. Newbury Park. Army Missile Command, Redstone Arsenal, Huntsville, Ala.

—**H. Halvorson, Inc.**, Spokane, Wash. $1,-009,852. Construction of a shopping center and 31 houses with curbs, drives, walks, and parking areas, and for replacing water and gas lines. Fort Peck Dam, Montana. Engineer Dist., Omaha, Neb.

—**R. G. LeTourneau, Inc.**, Longview, Tex. $9,710,519. Metal parts for 750-lb. bombs. Longview. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Pace Corp.**, Memphis, Tenn. $1,249,560. Illuminating signals for ground operations. Memphis. Ammunition Procurement & Supply Agency, Joliet, Ill.

28—**Peter Kiewit Son Co.**, Seattle Wash. $4,-433,022. Construction of a multi-purpose, multi-story reinforced concrete structure at Tin City, Alaska. Engineer Dist., Anchorage, Alaska.

—**Eureka Williams Co.**, Bloomington, Ill. $1,-451,263. Metal parts for bomb fuzes. Bloomington. Procurement Detachment, Chicago, Ill.

—**Collins Radio Co.**, Richardson, Tex. $4,613,-491. AN/TRC–129 radio terminal sets. Richardson. Procurement Detachment, Chicago, Ill.

—**Jahncke Service, Inc.**, New Orleans, La. $1,423,964. Lease of a pipeline dredge and attendant plant for channel improvement and maintenance dredging along the Missisippi River from Columbus, Ky. to Vicksburg, Miss. Engineer Dist., Memphis, Tenn.

—**United Aircraft**, Windsor Locks, Conn. $1,-712,545. Propeller systems for OV–1 (Mohawk) helicopters. Windsor Locks. Army Aviation Materiel Command, St. Louis, Mo.

—**Beech Aircraft**, Wichita, Kan. $5,000,000. U–21A utility aircraft. Wichita. Army Aviation Materiel Command, St. Louis, Mo.

—**Dynamics Corp. of America**, Bridgeport, Conn. $1,233,696. Generator sets. Bridgeport. Army Mobility Equipment Command, St. Louis, Mo.

—**Iowa Mfg. Co.**, Cedar Rapids, Iowa, $1,-620,711. Crushing and screening plants. Cedar Rapids. Army Mobility Equipment Command, St. Louis, Mo.

—**Zeller Corp.**, Defiance, Ohio. $1,902,773. Metal parts for 20-mm projectiles. Defiance. Frankford Arsenal, Philadelphia, Pa.

—**Harvey Aluminum Co.**, Torrance, Calif. $1,975,000. Metal parts for 20mm projectiles. Torrance. Frankford Arsenal, Philadelphia, Pa.

—**Washington University**, St. Louis, Mo. $1,-000,000. Research in macromodular computer systems. St. Louis. Defense Supply Service, Washington, D. C.

—**Radalab**, Westbury, N.Y. $5,310,500. Terminal telephones. Westbury. Army Electronics Command, Philadelphia, Pa.

—**R.C.A.**, Camden, N.J. $4,094,745. Radio sets and receivers. Camden. Army Electronics Command, Philadelphia, Pa.

—**AVCO Corp.**, Cincinnati, Ohio. $1,738,529. Antennae. Cincinnati. Army Electronics Command, Philadelphia, Pa.

—**Collins Radio Co.**, Dallas, Tex. $2,495,000. A high frequency communication system consisting of four HV radio stations and spare parts. Dallas. Army Electronics Command, Philadelphia, Pa.

—**SMC Corp.**, Deerfield, Ill. $2,355,042. Teletypewriter sets. Deerfield. Army Electronics Command, Philadelphia, Pa.

—**Raytheon Co.**, Norwood, Mass. $4,462,135. Code modulation equipment. North Dighton, Mass. Army Electronics Command, Philadelphia, Pa.

—**Fontaine Truck Equipment Co.**, Birmingham, Ala. $2,225,507. 25-ton semi-trailers. Haleyville, Ala. Army Tank Automotive Command, Warren, Mich.

—**Hupp Corp.**, Canton, Ohio. $2,585,115. 2½-ton truck engine assemblies. Canton. Army Tank Automotive Command, Warren, Mich.

—**Continental Motors**, Muskegon, Mich. $7,-129,211. M48 and M60 tank engine assemblies. Muskegon. Army Tank Automotive Command, Warren, Mich.

—**General Motors**, Indianapolis, Ind. $1,352,-

128. Transmissions for the 175mm self propelled gun, the eight-inch howitzer, and the armored recovery vehicle. Indianapolis. Army Tank Automotive Command, Warren, Mich.

—**Firestone Tire & Rubber Co.**, Akron, Ohio. $1,590,688. Maintenance and support services, and movement of Government equipment and property from Lordstown, Pa., to the Ammunition Plant, Ravenna, Ohio. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**U.S. Rubber Co.**, New York, N.Y. $20,493,-397. Explosives, ordnance components and Operations and Maintenance Activities at the Ammunition Plant, Joliet. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Hercules, Inc.**, Wilmington, Del. $1,371,434. Manufacture of miscellaneous propellants and explosives and Operations and Maintenance Activities at the Ammunition Plant, Radford, Va. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**General Motors**, Detroit, Mich. $4,799,250. Body and band assemblies for 81mm projectiles. Warren Mich. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Northrop Corp.**, Needham Heights, Mass. $1,611,869. Fin assemblies for 81mm mortars. Needham Heights. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Raytheon Co.**, Lexington, Mass. $1,968,000. Metal parts for 750-lb. bomb fuzes. Bristol, Tenn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**General Instrument Corp.**, Chicopee, Mass. $1,915,452. Metal parts for 750-lb. bomb fuzes. Chicopee. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Chamberlain Corp.**, Waterloo, Iowa. $4,-976,600. Metal parts for 175mm projectiles. Scranton, Pa. Ammunition Procurement & Supply Agency, Joliet, Ill.

Honeywell, Inc., Hopkins, Minn. $2,031,120. 750-lb. bomb nose fuzes. Twin Cities Army Ammunition Plant, New Brighton, Minn. Ammunition Procurement & Supply Agency, Joliet, Ill.

—**Amron, Corp.**, Waukesha, Wis. $1,526,022. 40mm cartridge cases. Waukesha. Ammunition Procurement & Supply Agency. Joliet, Ill.

—**Norris Industries**, Los Angeles, Calif. $7,-950,000. 105mm cartridge cases. Riverbank, Calif. Ammunition Procurement & Supply Agency, Joliet, Ill.

NAVY

3—**Raytheon Co.**, Lexington, Mass. $18,059,-480. Sparrow III guided missiles and related equipment. Lowell, Mass. Naval Air Systems Command.

—**Northrop Corp.**, Newbury Park, Calif. $5,-361,000. MQM-74A target drones. Newbury Park. Naval Air Systems Command.

—**Data Products Corp.**, Culver City, Calif. $1,342,948. High-speed line printers for ship computer systems. Culver City. Naval Ship Systems Command.

4—**Litton Systems, Inc.**, Van Nuys, Calif. $51,500,000. Air operation centrals, huts, radar modification kits and repair parts for use with the Marine Corps Tactical Data System. Van Nuys. Naval Ship Systems Command.

—**North American Aviation**, Columbus, Ohio. $5,700,000. RA-5C aircraft. Columbus. Naval Air Systems Command.

—**Sperry-Farragut Co.**, Bristol, Tenn. $1,105,-701. Missile guidance and control sections, and wing and fin sets for Shrike missiles. Bristol, Naval Air Systems Command.

—**Riha Construction Co.**, La Mesa, Calif. $1,-042,384. Construction of barracks at the Fleet Anti-Submarine Warfare School in San Diego, Calif. Southwest Div., Naval Facilities Engineering Command, San Diego, Calif.

5—**North American Aviation**, Anaheim, Calif. $1,671,500. Components for Ships Inertial Navigation Systems. Anaheim. Naval Ship Systems Command.

—**Hydranamic Systems Corp.**, Kent, Wash. $1,110,920. Mark VII arresting engines, with repair parts, for use on aircraft carriers. Kent. Naval Engineering Center, Philadelphia, Pa.

—**Del Guzzi Construction Co.**, Port Angeles, Wash. $1,032,533. Construction of a torpedo shop at the Naval Torpedo Station, Keyport, Wash. Northwest Div., Naval Facilities Engineering Command, Seattle, Wash.

—**Jordan Co.**, Suisun City, Calif. $2,708,000. Construction of recruit barracks at the Naval Training Center, San Diego, Calif. Southwest Div., Naval Facilities Engineering Command, San Diego, Calif.

—**Baifield Industries**, Dallas, Tex. $5,289,885. Bomb fins for 500-lb. bombs. Scranton, Pa. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**Poloron Products**, New Rochelle, N.Y. $2,-477,025. Bomb fins for 500-lb. bombs. Scranton, Pa. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**Metals Engineering Co.**, Greeneville, Tenn. $1,986,474. Bomb fins for 500-lb. bombs. Greeneville. Navy Ships Parts Control Center, Mechanicsburg, Pa.

6—**Western Electric**, New York, N.Y. $2,400,-000. Research and development on passive acoustic sonar for aircraft. Winston-Salem, N.C. Naval Air Systems Command.

—**United Aircraft**, Stratford, Conn. $3,621,-857. HH-53B helicopters for the Air Force. Stratford. Naval Air Systems Command.

—**United Boatbuilders**, Bellingham, Wash. $3,778,720. 80 river patrol boats. Bellingham. Naval Ship Systems Command.

7—**Maxson Electronics Corp.**, Old Forge, Pa. $1,800,000. To increase the limitation of authorization for Bullpup guided missiles. Old Forge. Naval Air Systems Command.

—**Lockheed Missiles & Space Co.**, Sunnyvale, Calif. $3,919,816. Tactical engineering services on the Polaris missile system. Sunnyvale. Special Projects Office.

—**General Electric**, Binghampton, N.Y. $1,-909,477. ASA-32 automatic flight control systems and related equipment for the Air Force. Johnson City, N.Y. Naval Air Systems Command.

—**Goodyear Aerospace Corp.**, Akron, Ohio. $4,503,727. Subroc. Akron. Naval Ordnance Systems Command.

—**Martin Marietta**, Baltimore, Md. $1,500,-000. Classified work on Navy aircraft. Baltimore. Naval Air Systems Command.

10—**Hughes Aircraft Co.**, Culver City, Calif. $2,799,300. Design and fabrication of a multi-function radar antenna and related services and equipment. Culver City. Naval Air Systems Command.

—**Sperry Rand Corp.**, Syosset, N.Y. $1,911,-000. Inertial navigation subsystem components for nuclear-powered fleet ballistic missile submarines. Syosset. Naval Ship Systems Command.

—**W. H. Belanga & Associates**, Norfolk, Va. $2,413,425. Rehabilitation of barracks and mess halls at the Naval Air Station, Norfolk, Va. Atlantic Div., Naval Facilities Engineering Command, Norfolk, Va.

11—**EFMC Corp.**, Los Angeles, Calif. $1,278,-366. Mark 19, MOD 1, plastic weather shields for 3-inch, 50-caliber twin gun mounts. Los Angeles. Naval Ordnance Station, Louisville, Ky.

—**Electromagnetic Technology Corp.**, Colmar, Pa. $1,648,720. Transistorized electron counters. Colmar. Naval Ship Systems Command.

—**Sperry Rand Corp.**, Charlottesville, Va. $3,085,003. Periscopes, adapter systems, hoist yokes, engineering services and repair parts. Charlottesville. Naval Ship Systems Command.

—**Collins Radio Co.**, Richardson, Tex. $7,-000,000. VLF airborne communications systems and related equipment for installation in C-130 aircraft. Richardson. Naval Air Systems Command.

12—**General Dynamics**, Pomona, Calif. $2,324,-400. Increase the limitation of authorization for material and assemblies for the Standard ARM missile. Pomona. Naval Air Systems Command.

—**Whittaker Corp.**, Denver, Colo. $1,500,090. Production of MK 46 batteries. Denver. Naval Ordnance Systems Command.

—**Yardney Electric Co.**, New York, N.Y. $1,-404,540. MK 53 batteries. Denver, Colo. Naval Ordnance Systems Command.

—**North American Aviation**, McGregor, Tex. $1,144,640. MK 39 rocket motors and related equipment. McGregor. Naval Air Systems Command.

—**Jordan Co.**, Suisun City, Calif. $1,619,000. Construction of barracks at the Naval Air Station, North Island, San Diego, Calif. Southwest Div., Naval Facilities Engineering Command, San Diego, Calif.

13—**Sperry Rand Corp.**, Great Neck, N.Y. $2,-000,000. Production of MK 66 signal data converters for the Talos missile. Great Neck. Naval Ordnance Systems Command.

—**Hubbard Construction Co.**, Orlando, Fla. $1,206,800. Installation of utilities and for a drill field at the Naval Training Center, Orlando, Fla. Southeast Div., Naval Facilities Engineering Command, Charleston, S.C.

—**Jefferson Construction Co.**, Cambridge, Mass. $2,103,000. Construction of a bachelor officer's quarters at the Naval Station, Newport, R.I. Northeast Div., Naval Facilities Engineering Command, Boston, Mass.

—**ITT Federal Laboratories**, Nutley, N.J. $5,-450,000. Classified electronics equipment. Nutley. Naval Ship Systems Command.

—**Sylvania Electric Products**, Waltham, Mass. $1,925,000. Airborne receiver transmitter radio sets and related equipment. Waltham. Naval Air Systems Command.

14—**Garrett Corp.**, Los Angeles, Calif. $1,015,-464. Compressor power units and related equipment. Torrance, Calif. Naval Air Systems Command.

—**Northrop Corp.**, Newbury Park, Calif. $2,-694,700. Two anti-submarine classification analysis centers. Naval Air Development Center, Johnsville, Pa.

—**Norris Industries**, Los Angeles, Calif. $15,066,000. 500-lb. MK 82 bomb bodies. Vernon, Calif. Navy Ships Parts Control Center, Mechanicsburg, Pa.

17—**Austin-Wright Construction Co.**, Oklahoma City, Okla. $2,955,000. Rehabilitation of barracks at the Marine Corps Air Station, Cherry Point, N.C. Atlantic Div., Naval Facilities Engineering Command, Norfolk, Va.

—**P. H. Lusardi Construction Co.**, Vista, Calif. $1,974,500. Construction of a battalion vehicle maintenance shop, administration building, supply operations building, battalion recreation building and a regimental administration building at Camp Pendleton, Calif. Southwest Div., Naval Facilities Engineering Command, San Diego, Calif.

—**P. H. Lusardi Construction Co.**, Vista, Calif. $1,274,000. Construction of a base headquarters division area at Camp Pendleton, Calif. Southwest Div., Naval Facilities Engineering Command, San Diego, Calif.

—**McDonnell Co.**, St. Louis, Mo. $1,200,203. Work on F-4 aircraft. St. Louis. Naval Air Systems Command.

18—**Grumman Aircraft Engineering Corp.**, Bethpage, N.Y. $30,600,000. A-6A aircraft. Bethpage. Naval Air Systems Command.

—**Northrop Corp.**, Newbury Park, Calif. $2,-100,000. Design, development, fabrication, testing and furnishing of an overall mobile anti-submarine warfare target system. Newbury Park. Naval Ordnance Systems Command.

—**American Mfg. Co of Tex.**, Fort Worth, Tex. $1,569,812. Projectiles for 5-inch 54-cal. guns. Fort Worth. Navy Ships Parts Control Center, Mechanicsburg, Pa.

19—**Todd Shipyards**, New Orleans, La. $2,072,-000. Repair of hull, machinery, electrical and miscellaneous damage to drydock AFDM-2. New Orleans. Supervisor of Shipbuilding, Eighth Naval Dist., New Orleans, La.

—**Wells Industries**, North Hollywood, Calif. $1,276,580. Ground support equipment for starting jet engine aircraft. North Hollywood. Naval Air Systems Command.

20—**Boeing Co.**, Morton, Pa. $10,241,103. CH-46D helicopters. Morton. Naval Air Systems Command.

—**Johns Hopkins University, Applied Physics Laboratory**, Silver Spring, Md. $2,642,000. Research and development on the Bumblebee project. Silver Spring. Naval Ordnance Systems Command.

—**Curtiss Wright Corp.**, Wood-Ridge, N.J. $1,799,996. Compressor blades for J-65 engines. Wood-Ridge. Navy Aviation Supply Office, Philadelphia, Pa.

—**Gretna Machine & Iron Works**, Harvey, La. $1,298,000. Five fuel oil barges. Harvey. Naval Ship Systems Command.

21—**Bendix Corp.**, Baltimore, Md. $9,183,201. Airborne radio receiver transmitter sets and related equipment. Baltimore. Naval Air Systems Command.

—**Honeywell, Inc.**, Hopkins, Minn. $2,909,700. Fabrication of components for the Rockeye II weapon system. Hopkins. Navy Purchasing Office, Los Angeles, Calif.

24—**Clevite Corp.**, Cleveland, Ohio. $2,500,000. Research and development of a new torpedo test vehicle. Cleveland. Naval Ordnance Systems Command.

—**Douglas Aircraft Co.**, Long Beach, Calif. $20,628,000. Additional funding for A4F aircraft. Long Beach. Naval Air Systems Command.

—**H. R. Beebe, Inc.**, Utica, N.Y. $1,236,520. Conversion of an electronic research laboratory at Griffiss AFB, N.Y. Eastern Div., Naval Facilities Engineering Command, New York, N.Y.

25—**General Dynamics**, Quincy, Mass. $23,848,-

000. Construction of a dock landing ship. Quincy. Naval Ship Systems Command.

—**Steel Cot Corp.**, Birmingham, Ala. $1,574,804. Mark 9 ammunition pallets. Birmingham. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**United Aircraft**, East Hartford, Conn. $2,781,912. Spare parts for fighter aircraft engines. East Hartford. Navy Aviation Supply Office, Philadelphia, Pa.

—**Maxson Electronics Corp.**, Macon, Ga. $1,208,304. 5-inch, 54-cal. projectile fuzes. Macon. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**Western Electric**, New York, N.Y. $10,115,000. Oceanographic research. Overseas. Navy Purchasing Office, Washington, D.C.

—**American Machine & Foundry Co.**, York, Pa. $10,887,000. Mark 82, MOD 1, 500-lb. bomb bodies. York. Navy Ships Parts Control Center, Mechanicsburg, Pa.

—**General Dynamics**, Pamona, Calif. $2,830,000. Manufacture, assemble and check out guidance and control components for improved Tartar and HT-3A Terrier missiles and related equipment. Pomona. Naval Ordnance Systems Command.

—**Paul J. Vagnoni**, North Hills, Pa. $1,300,000. Construction of enlisted men's barracks at the Naval Station, Philadelphia, Pa. East Central Div., Naval Facilities Engineering Command, Philadelphia, Pa.

—**D. Geyer Construction**, Monterey, Calif. $1,624,000. Construction of additional academic facilities at the Naval Post Graduate School, Monterey, Calif. Western Div., Naval Facilities Engineering Command, San Bruno, Calif.

26—**Stromberg Carlson**, San Diego, Calif. $1,686,500. Airborne tactical data display systems for ASW aircraft. San Diego. Naval Air Systems Command.

—**Sanders Associates**, Nashua, N.H. $3,000,000. Basic engineering and development of an air droppable ASW sonobuoy system. Nashua. Naval Air Systems Command.

—**Sperry Rand Corp.**, Syosset, N.Y. $3,388,000. Intertial navigation subsystem components. Syosset. Naval Ship Systems Command.

—**Lockheed Missile & Space Co.**, Sunnyvale, Calif. $50,838,766. Polaris A-3 missiles. Sunnyvale. Special Projects Office.

27—**Westinghouse Electric**, Baltimore, Md. $1,200,000. Airborne radar sets. Baltimore. Naval Air Systems Command.

—**United Aircraft**, East Hartford, Conn. $1,149,163. Incremental funding for J60-P-6 engines. East Hartford. Naval Air Systems Command.

—**Lockheed Aircraft**, Burbank, Calif. $5,584,349. Extension of long lead time effort to support FY 1967 procurement of P3B aircraft. Naval Air Systems Command.

—**Todd Shipyards**, San Pedro, Calif. $1,039,515. Regular overhaul of the oiler USS Tolovana (AO-64). San Pedro. Supervisor of Shipbuilding, Eleventh Naval Dist,, San Diego, Calif.

—**American Mfg. Co. of Tex.**, Fort Worth, Tex. $21,358,560. Mark 82 bodies for 500-lb. bombs. Fort Worth. Navy Ships Parts Control Center, Mechanicsburg, Pa.

28—**Parker Aircraft**, Los Angeles, Calif. $1,318,398. Fueling-at-sea probes and receivers. Los Angeles. Naval Ship Systems Command.

—**Owen L. Schwam Construction Co.**, Newton Highlands, Mass. $1,094,000. Construction of a mess hall at the Naval Submarine Base, New London, Conn. Eastern Div., Naval Facilities Engineering Command, New York, N.Y.

AIR FORCE

3—**Stromberg-Carlson Corp.**, Rochester, N.Y. $1,074,452. Central telephone office equipment. Rochester. Oklahoma City Air Materiel Area, (AFLC), Tinker AFB, Okla.

—**Chicago Aerial Industries**, Barrington, Ill. $3,619,016. Aircraft camera systems. Barrington. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

4—**General Dynamics**, San Diego, Calif. $1,882,539. F-106 aircraft. San Diego. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

5—**RCA**, Burlington, Mass. $1,000,000. Work on an airborne data automation system. Burlington. Electronic Systems Div., (AFSC), L. G. Hanscom Field, Mass.

—**Hughes Aircraft**, Los Angeles, Calif. $1,750,000. Production of electronic equipment for F-105 aircraft. El Segundo, Calif. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

6—**Dynamics Corporation of America**, Garden City, N.Y. $1,000,000. Production of modification kits for radar bombing systems. Garden City. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

—**Curtiss-Wright Corp.**, Wood-Ridge, N.J. $1,000,013. Engineering services to support R-3350, R-1820 and R-1300 reciprocating aircraft engines. Wood-Ridge. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

—**General Dynamics/Convair**, San Diego, Calif. $2,800,000. Procurement of Atlas/Agena space boosters. San Diego. Space Systems Div., (AFSC), Los Angeles, Calif.

—**Magnovox Co.**, Fort Wayne, Ind. $1,972,392. Production of airborne communications equipment. Fort Wayne. Warner-Robins Air Materiel Area, (AFLC), Robins AFB, Ga.

7—**General Electric**, West Lynn, Mass. $3,856,171. Production of J-85 engines. West Lynn. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

11—**Douglas Aircraft**, Santa Monica, Calif. $1,992,418. Production of components for the Genie air-to-air missile. Santa Monica. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

—**Lockheed Aircraft**, Jamaica, N.Y. $4,290,000. Inspection and repair as necessary on C-121 aircraft. Jamaica. Sacramento Air Materiel Area, (AFLC) McClellan AFB, Calif.

—**American Electric**, La Mirada, Calif. $1,357,581. Production of external fuel tanks for F-101 aircraft. La Mirada. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

—**Thiokol Chemical Corp.**, Brigham City, Utah. $1,601,000. Work on a post boost rocket propulsion system. Brigham City. Air Force Flight Test Center, Edwards AFB, Calif.

12—**Fairchild Hiller Corp.**, Farmingdale, N.Y. $1,522,120. Production of components for the emergency flight control system of F-105 aircraft. Farmingdale. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

—**Magnavox Co.**, Fort Wayne, Ind. $1,250,000. Production of airborne communications equipment. Fort Wayne. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Emerson Electric**, St. Louis, Mo. $1,350,000. Production of a ground test system for the testing of aircraft avionics systems. St. Louis. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

14—**AVCO-Everett Research Laboratory**, Everett, Mass. $1,750,000. Work on the radiation research program. Everett. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

—**B. F. Goodrich Co.**, Akron, Ohio. $2,570,865. Production of F-4 aircraft tires. Akron. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

17—**North American Aviation**, Los Angeles, Calif. $3,147,858. Pylon assemblies for F-100 aircraft. Los Angeles. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

—**Olin Mathieson Chemical Corp.**, East Alton, Ill. $1,452,000. Engine starter cartridges for B-57 aircraft. Marion, Ill. Ogden Air Materiel Area, (AFLC), Hill AFB, Utah.

18—**General Electric**, West Lynn, Mass. $1,925,000. Production of J-85 engines for A-37 aircraft. West Lynn. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**North American Aviation**, Anaheim, Calif. $1,200,000. Production of guidance and control systems for Minuteman II missile systems. Anaheim. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

—**General Electric**, Philadelphia, Pa. $2,000,000. Research and development of MARK 12 penetration aid systems. Philadelphia. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

—**Daisy Mfg. Co.**, Rogers, Ark. $2,647,500. Production of non-explosive components for munitions. Rogers. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Superior Steel Ball Co.**, New Britain, Conn. $3,330,000. Non-explosive components for munitions. New Britain. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Koehler & Sons**, Hatboro, Pa. $1,692,900. Non-explosive components for munitions. Hatboro. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Sterling Commercial Steel Ball Corp.**, Sterling, Ill. $3,217,500. Production of non-explosive components for munitions. Sterling. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Honeywell, Inc.**, Hopkins, Minn. $1,386,000. Non-explosive components for munitions. New Brighton, Minn. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

19—**United Technology Center**, Sunnyvale, Calif. $5,419,000. Long lead hardware for solid rocket motors for Titan III. Sunnyvale. Space Systems Div., (AFSC), Los Angeles, Calif.

20—**Ryan Aeronautical Co.**, San Diego, Calif. $1,409,000. Target drones and related equipment. San Diego. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

21—**Fairchild Hiller Corp.**, Farmingdale, N.Y. $1,250,000. Engineer services and materials related to installation of a flight control system in F-104 D/F series aircraft. Farmingdale. Sacramento Air Materiel Area, (AFLC), McClellan AFB, Calif.

—**TRW, Inc.**, Redondo Beach, Calif. $2,011,000. Research and development for long lead time items for the VELA satellite program launch vehicle. Redondo Beach. Space Systems Div., (AFSC), Los Angeles, Calif.

—**AVCO Corp.**, Stratford, Conn. $1,854,000. Work on the Mark 11A re-entry vehicle. Stratford. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

—**North American Aviation**, Anaheim, Calif. $3,055,000. Maintenance, repair, overhaul and modification of Minuteman guidance and control systems. Anaheim. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

24—**L. T. Industries**, Dallas, Tex. $1,302,753. Production of aircraft bomblet dispensers. Garland, Tex. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**LLUTS Construction Co.**, Pueblo, Colo. $1,149,078. Construction of Minuteman training facilities. Minot AFB, N.D. and Warren AFB, Wyo. Corps of Engineers Ballistic Missile Construction Office, Norton AFB, Calif.

—**COMCOR, Inc.**, Anaheim, Calif. $1,156,000. Procurement of an integrated computer system. Anaheim. Systems Engineering Group, Wright-Patterson AFB, Ohio.

25—**General Electric**, Cincinnati, Ohio. $5,699,400. Production of J-79-15 and J-79-17 aircraft engines. Evendale, Ohio. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

26—**Westinghouse Electric**, Baltimore, Md. $1,300,000. Engineering services and production of electronic countermeasure equipment. Baltimore. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Batesville Mfg. Co.**, Camden, Ark. $7,220,150. Production of dispensers for bomblets. Camden. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

—**Lockheed Missile & Space Co.**, Sunnyvale, Calif. $1,961,000. Agena launch services at the Eastern Test Range. Cocoa Beach, Fla. Space Systems Div., (AFSC), Los Angeles, Calif.

—**Radiation, Inc.**, Melbourne, Fla. $3,010,847. Production of ground station telemetry equipment. Melbourne. Space Systems Div., (AFSC), Los Angeles, Calif.

—**E. W. Bliss Co.**, South Portland, Maine. $1,259,660. Production of aircraft arresting barriers. South Portland. San Antonio Air Materiel Area, (AFLC), Kelly AFB, Tex.

27—**North American Aviation**, Canoga Park, Calif. $1,138,335. Engineering support of the Atlas booster engine systems. Canoga Park. Space Systems Div., (AFSC), Los Angeles, Calif.

—**Ajax Hardware Corp.**, Industry, Calif. $1,221,253. Production of bomb components. Industry. Aeronautical Systems Div., (AFSC), Wright-Patterson AFB, Ohio.

28—**Philco-Ford Corp.**, Palo Alto, Calif. $3,340,000. Work on a satellite control network. Palo Alto. Space Systems Div., (AFSC), Los Angeles, Calif.

—**Philco-Ford Corp.**, Palo Alto, Calif. $1,519,957. Design, development, fabrication, flight test and data analysis of re-entry measurement vehicles. Newport Beach, Calif. Ballistic Systems Div., (AFSC), Norton AFB, Calif.

—**Martin-Marietta**, Denver, Colo. $3,100,000. Work on the Titan IIIM space booster. Denver. Space Systems Div., (AFSC), Los Angeles, Calif.

—**International Telephone & Telegraph**, Nutley, N.J. $2,650,296. Airborne LORAN navigational sets and related equipment. Nutley. Aeronautical Systems Div. (AFSC), Wright-Patterson AFB, Ohio.

DCAS Seeks Better Administration of Government Property in Plants

A new policy for better administration of Government-owned machinery, industrial buildings and basic materials for producing defense products has been initiated by the Defense Contract Administration Services (DCAS) of the Defense Supply Agency.

Major General John A. Goshorn, USA, Deputy Director for Contract Administration Services, who has the operational responsibility for administration of industrial property, has directed that a large percentage of his nation-wide work force of 22,000 employees apply specialized technical talents to administering Government-owned industrial property in contractors' plants.

Previously, approximately 300 property administration specialists in the 11 DCAS regions in the United States have carried the entire burden of overseeing the hundreds of millions of dollars worth of Government property in plants. The new policy leaves the basic responsibility with these specialists but assigns, in addition, responsibilities to various other contract administration specialists who are at or near contractors' plants to watch over specialized aspects of property administration.

The new emphasis on property administration is in line with a directive from President Johnson to heads of Government departments and agencies for "improvement in property management by contractors." DCAS personnel do not directly manage Government property in plants; rather, they represent the Government in plants to assure that contractors comply with standard provisions of the Armed Services Procurement Regulation and their own contractual agreements relating to Government property. Quality assurance representatives, industrial specialists, transportation officers and specialists will continue to have overall responsibility.

Following are some of the principal characteristics of property administration with indications of the qualified specialist to be assigned:

Maintenance. A direct relationship exists between product quality and the care of the equipment or tooling used to produce the item. For this reason, DCAS quality assurance representatives will monitor the contractors' maintenance of Government-owned plant equipment, special test equipment and special tooling. Maintenance of Government-owned real estate or structures will be surveyed by DCAS industrial specialists.

Utilization. Government property provided to contractors may be used only for purposes authorized and must be returned when that use is no longer justified. Because of the relationship of the use of industrial plant equipment to the contractors overall production capacity or need, industrial specialists will be responsible now for surveying contractors' utilization controls over that kind of property.

Excess Declarations. In the economic reutilization of Government property the true condition of items must be described to the contractors and military installations who are potential users; otherwise, unnecessary and costly shipments of unusable material or equipment may result. Since the condition of property is ordinarily based upon a final inspection, verification of contractors' descriptions has been assigned to quality assurance representatives.

Shipment. There are many reports and methods for adjusting overages, shortages, or damages that are found to exist upon receipt of shipments of Government property. Since these matters relate to packaging, preservation and transportation regulations, the responsibilities are being defined and assigned respectively to quality assurance representatives and transportation agents.

Coordination. In order that there will be no wasted or duplicative effort, more effective use will be made of existing documentation of Government industrial property. Examples are in the use of quality assurance representatives' controls over property returned to a contractor for analysis in connection with a material deficiency complaint. Also, when specialized safety engineers in the course of their plant safety surveys detect potential hazards that could jeopardize property, their recommendations will be made available to property administrators. Likewise, when quality assurance surveys encounter excessive rejects or undue waste in production or fabrication, quality assurance representatives will provide appropriate comments to property administrators.

These management improvements will soon be formalized and published as changes in applicable DCAS operating manuals. However, many of them are now in operation with encouraging results. The whole system will be in operation before the end of 1967.

DEFENSE PRIME CONTRACT AWARDS TO SMALL BUSINESS

(Amounts in Thousands)

	July 66–Feb. 67	July 65–Feb. 66
Procurement from All Firms	$25,451,246	$20,042,934
Procurement from Small Business Firms	5,112,317	4,275,718
Percent Small Business	20.1	21.3

United States, Australia, Canada To Develop Tactical Communications System

The United States will participate in a major cooperative program with Australia and Canada to develop a comprehensive tactical communications system common to the field armies of the three countries.

The system, known as the Mallard Project, will employ all modes of message and data transmission, ranging from simple written messages and voice-radio links to automatically switched, digital systems and, possibly, communications satellites.

Brigadier General Paul A. Feyereisen, USA, has been designated the U.S. program manager for the Mallard Project. Lieutenant Colonel L. G. Moore and Lieutenant Colonel D. C. Coughtry have been named program managers for Australia and Canada, respectively. The office of Mallard's U.S. program manager and the project's primary operating element, the International Joint Engineering Agency, will be located at Fort Monmouth, N.J.

In the initial development phase of the program, competitive system design studies will be solicited from U.S. industry. Participation by industry of all three countries will be encouraged in the conduct of certain supporting technique efforts. The schedule calls for a five- to seven-year research and development program, and a follow-on phase for equipment production, to provide the Mallard system for the participating armies in the 1975–77 time frame.

The system approach will incorporate the building-block or modular principle of equipment construction to ensure flexible inter-operation between the field armies of the three countries and, with the proper combinations of subsystems, to provide comprehensive communications ranging from front-line fighting units through major echelon headquarters to inter-operation with world-wide strategic systems.

State-of-the-art technology will be employed to reduce the size, weight and reaction time of system components and to incorporate the concepts of mobility, versatility and high reliability.

New Navy R&D Facility Features Huge Spin Chamber

The Government's largest spin chamber has been put into operation by the Naval Air Engineering Center, Philadelphia, Pa., as part of its Aeronautical Engine Laboratory's Containment Evaluation Facility (AELCEF). Goal of the facility will be to provide lightweight containment/control devices that will prevent fragments of failed turbomachines from injuring personnel and minimize aircraft damage.

A feature of the AELCEF is the capability to photograph the interactions of fragments and the containment of deflection devices. Action is recorded by a high speed continuous framing camera that can be positioned at either one of four photographic observation ports located around the chamber.

The AELCEF is equipped with airpowered drive turbines that can rotate a variety of fragment generators over a wide range. A 1,000-pound work piece can be rotated at 25,000 rpm and an eight-pound piece can be spun to a maximum of 150,000 rpm.

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